The Dental Digest.

Vol. XI. CHICAGO, MAY, 1905. No. 5.

Original Contributions.

DEVELOPMENT OF THE MOUTH AND TEETH, BASED UPON ORIGINAL INVESTIGATION.

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(Concluded from p. 352 of April DENTAL DIGEST.)

While these changes have been going on, i. e., while the enamel organ and dentin germ have been forming, a third tissue has been developing from the mesoblastic tissue at the base of the dentin germ, having its origin in common with that tissue, and which will result in the formation of the dental sacculus and give us the third and last tissue of the dental follicle. Starting at the same time as does the dentin germ, it consists of a double membrane of small round mesoblastic cells, and assuming a somewhat circular, sac-like form, this last structure develops outward and upward around the base of the dentin germ (Figs. 17, 18, 20); on past and upward around and over the top of the enamel organ, severing its connection with its original epiblastic cord, and continuing up over its upper surface completely surrounds and envelops both the dentin germ and enamel organ in a closed double-layered sac (Fig. 23, longitudinal section), while Fig. 24 shows the structure in cross-section. The stratum malpigii of the enamel organ of the "pear-shaped" stage, and which we remember was *external* at that time, having now become absorbed, the internal layer of the dental sacculus lies immediately in contact with the stellate reticulum of the enamel organ, and being a mesoblastic tissue (i. e., connective tissue), will be the means whereby the enamel organ will obtain its blood supply and, therefore, its inorganic salts during the process of calcification.

With the formation of the dental sacculus we have the completion of the dental follicle. This (Fig. 23) is seen therefore to be made

up of three different structures—the enamel organ, the dentin germ and the dental sacculus. The dentin germ from *without inward* (Fig. 26, longitudinal section, and Fig 25, cross section) is com-

FIGURE XXIV.

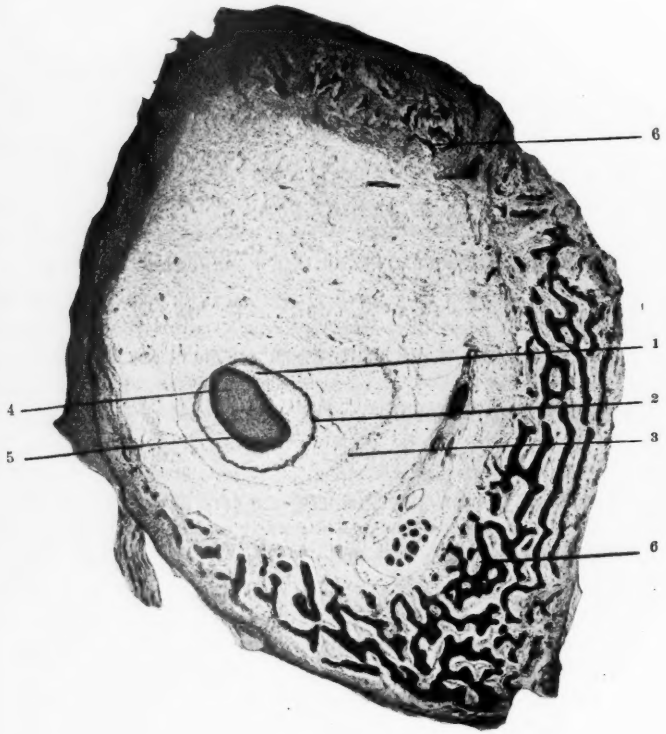


Figure 24. Cross section through the follicle of the stage shown in Figure 23. (1) Stellate reticulum of the enamel organ. (2) External membrane of the enamel organ, i. e., the degenerating cells external to the stellate reticulum. (3) Sacculus. (4) Cells of the dentin germ. (5) *Odontoblasts.* (6) Developing bone.

posed of a single layer of columnar-shaped mesoblastic cells, the odontoblastic or *dentin-building layer.* Beneath the odontoblastic layer is a layer of pear-shaped goblet cells, less highly differentiated

than the odontoblastic layer. The remaining cells of the dentin germ consist of undifferentiated mesoblastic tissue cells, being but slightly advanced in development over the original mesoblastic cells of the six-week embryo. They contain occasional blood islands from which the blood vessels of the blood will be formed.

The enamel organ from *within outward* is composed of three different strata of epithelial cells. Most internally, immediately over

FIGURE XXV.

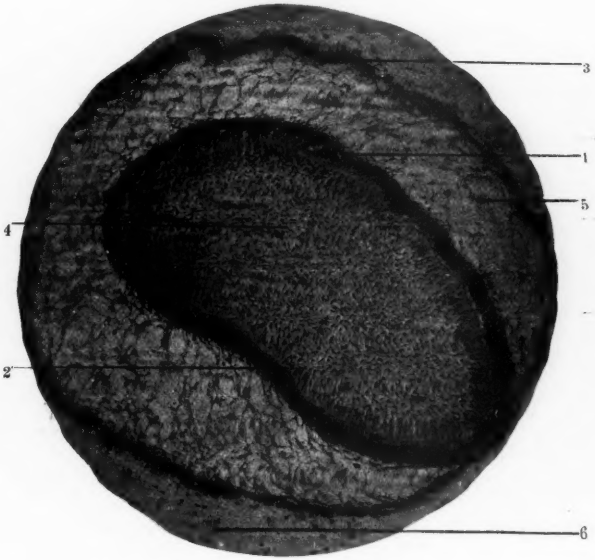


Figure 25. Same as Figure 24, under high magnification. (1) Stratum malpigii. (2) Odontoblasts. (3) Degenerating external membranes of the enamel organ. (4) Cells of dentin germ. (5) Stellate reticulum. (6) Connective tissue cells in contact with the external membranes of the enamel organ.

and in contact with the odontoblastic layer of the dentin germ, is a single layer of columnar cells, the stratum malpigii; external to the stratum malpigii is the intermediate layer, the stratum intermedium, while still more externally is the stellate reticulum.

The dental sacculus is composed of two membranes made up of small round mesoblastic cells, among which numerous blood vessels are developing.

Although outside the scope of the present paper, I cannot help mentioning a few brief facts on calcification, which I hope will somewhat simplify the matter for those who may otherwise have considerable difficulty in understanding this part of the subject. Calcification consists in a deposition of calcium salts within a previously

FIGURE XXVI.

Figure 26. Longitudinal section through the developing tooth, showing the condition at the apex of the follicle immediately succeeding the beginning of calcification. (1) Stratum malpigii. (2) Stratum intermedium. (3) Stellate reticulum. (4) Calcified dentin. (5) Odontoblasts. (6) Mesoblastic cells of the dentin germ or pulp. (7) Mesoblastic, i. e., connective tissue, cells external to the enamel organ.

formed organic matrix, and the deposition of calcium salts within the different previously formed organic matrices of the dental follicle will result in the formation of the fully developed enamel, dentin and cement, while certain other correlated developmental changes will result in the formation of the dental pulp with its vessels and

nerves and of the peridental membrane. Calcification of the enamel and dentin *starts at the border line between the enamel organ and the dentin germ,* dentin being formed by the odontoblasts, which obtain their calcium salts from the blood vessels of the pulp, and migrating *inward,* form dentin from *without inward;* while the ameloblasts, obtaining their calcium salts from the blood vessels of the connective tissue external to and in contact with the stellate reticulum, and migrating *outward,* form enamel from *within outward.*

The apex of the dentin germ is the first part to calcify (Fig. 26). The odontoblasts are the active agents in its calcification, obtaining their calcium salts from the blood vessels of the dentin germ and depositing them up against the internal surface of the stratum malpigii of the enamel organ. As the calcium salts continue to be deposited with the formation of more and more dentin the odontoblasts migrate *inward.* The formed dentin gradually increasing in thickness, the dentin germ gradually decreases in size to a corresponding degree, finally reaching its internal limit at the margin of the pulp, which in a fully developed tooth consists of that portion of the original dentin germ which remains uncalcified. As a matter of fact, inasmuch as the odontoblasts remain extant throughout the life of the tooth, and inasmuch also as they have a constant supply of inorganic salts from the blood vessels of the pulp, the odontoblasts never really reach an internal limit, but continue to form dentin, very slowly of course, and to lessen the size of the pulp until in old people the teeth apparently have no pulps. It is because of this fact also that children's teeth have such large pulps.

The active agent in the calcification of enamel is the layer of columnar epithelial cells, i. e., the stratum malpigii (which, when calcification begins, change their name and become known as the ameloblastic layer, i. e., enamel builders). The stellate reticulum, functioning as an *"enamel pulp"* of the enamel organ, is said to furnish the first calcium salts to the stratum malpigii or ameloblastic layer which deposits them, forming enamel, up against the already formed dentin, the ameloblasts advancing from *within outward* in front of the forming enamel. The enamel pulp, i. e., the stellate reticulum, becomes gradually absorbed before the outward advance of the ameloblasts, until finally the ameloblasts, reaching the external limit of the stellate reticulum, lie immediately beneath the internal

membrane of the dental sacculus, separated from it only by the cells of the stratum intermedium. The sacculus, *being a mesoblastic tissue,* is richly supplied with blood vessels, and therefore furnishes an abundant supply of calcium salts to the ameloblasts for the further

FIGURE XXVII.

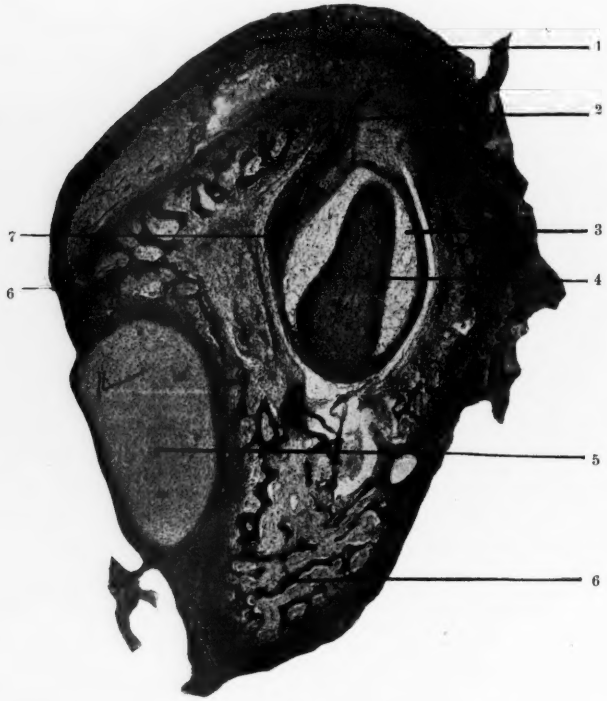


Figure 27. Cross section through inferior maxilla, showing first appearance of the enamel organ of the permanent tooth. (1) Surface epithelium. (2) Enamel cord. (3) Enamel organ of deciduous tooth. (4) Dentin germ. (5) Meckel's cartilage. (6) Developing bone. (7) Enamel organ of permanent tooth.

formation of enamel, the stratum intermedium acting as an intermediate agency between the sacculus and the ameloblasts, and small capillary loops of blood vessels being given off from the sacculus and extending into and through the stratum intermedium, which

acts as a selective agent of the material to be used in enamel construction.

And thus the ameloblasts reaching *outward*, and the odontoblasts *inward*, the entire cap or crown of the tooth is formed, there being as

FIGURE XXIX.

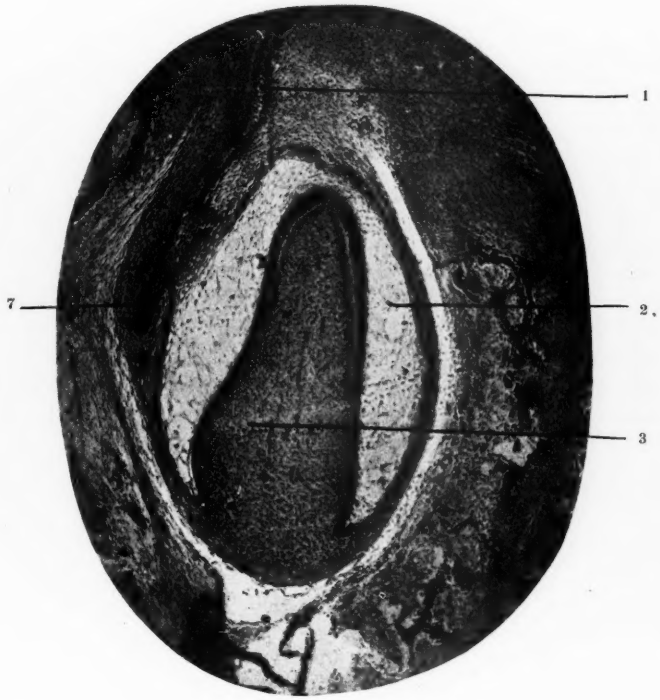


Figure 29. Same as Figure 27, under high magnification, showing the first appearance of the enamel organ of the permanent tooth. (7) Enamel organ of permanent tooth. (1) Enamel cord. (2) Enamel organ of deciduous tooth. (3) Dentin germ.

yet no sign or indication of a root formation. With the completion of the formation of the crown the secretion of the ameloblasts, i. e., the process of enamel formation, is ended. The odontoblasts, on the other hand, and in a manner exactly similar to that already (briefly) described, proceed with the formation of the *dentin portion* of the

root, the formed crown meanwhile migrating upward toward the surface in the direction of its eruption. With the upward movement of the crown begins the formation of the cement portion of the root.

Cement is formed by the lower portion of the inner membrane of the dental sacculus, i. e., from that portion in the future cervical region of the tooth which lies at this time below the lower portion of the formed enamel. Cement is formed (speaking generally and without reference to detail) in a manner almost exactly similar to the formation of the enamel, i. e., it is formed by osteoblasts (bone builders), and deposited layer by layer from *within outward* upon the already formed dentin of the root, which develops slightly in advance of the forming cement. Its development differs from enamel only in that whereas enamel is formed by the same layer of ameloblasts from beginning to end, cement is formed layer upon layer, each by an entirely new set of osteoblasts, each new set originating in turn from the inner membrane of the sacculus, and thus constructing a single layer of cement, they remain as the extant cells within the different lacunæ of the layer of cement which they have formed. By the time the cement is completely formed and has reached its external limit the alveolar process of the forming maxilla will have closed in upon it, and the root, then completely formed, will have become surrounded by the peridental membrane and the alveolar process of the then fully formed maxilla. The manner of this latter development will be taken up later.

DEVELOPMENT OF THE PERMANENT TEETH.

Thus far I have purposely omitted all reference to the manner of development of the permanent teeth, inasmuch as any mention of their formation could only have led to confusion and misunderstanding, whereas, taking them up independently at this time, inasmuch as their formation is almost exactly similar to that of the deciduous teeth, their development will be very easily understood, and their manner of formation will at the same time act as a summary of the different steps in the development of the deciduous teeth, and carrying them forward to the formation of the follicle, I shall then be in a position to take up and complete the formation of the lower jaw as we see it in its fully developed condition.

Instead of taking their origin directly from the epiblastic tissue lining the oral cavity, as in the case of deciduous teeth, the papillæ which will form the enamel organs of the permanent teeth bud off

from the enamel organs of the deciduous teeth (Fig. 27). *Could the enamel organs of the deciduous teeth at this time be shifted about so as to occupy the position of the epiblastic tissue lining the oral cavity, they would have exactly the same structure as this epiblastic*

FIGURE XXX.

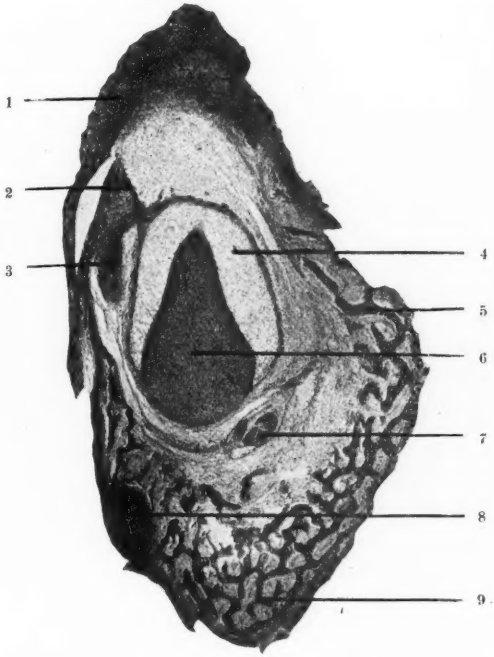


Figure 30. Cross section through the inferior maxilla, showing the germ of the deciduous tooth, with the enamel organ of the permanent tooth at a little later stage than is shown in Figure 29. (Low power.) (1) Surface epithelium. (2) Enamel cord. (3) Enamel organ of permanent tooth. (4) Enamel organ of deciduous tooth. (5) Alveolar process. (6) Dentin germ of deciduous tooth. (7) Inferior dental vessels. (8) Meckel's cartilage. (9) Developing bone.

tissue itself, i. e., we would have the stratum malpigii, stratum intermedium and stellate reticulum, each corresponding in position and relation with that of the oral epithelial tissue. So that the enamel papillæ of the permanent teeth, as they bud off from the deciduous teeth, develop a relation of parts exactly corresponding and similar

to the previously forming temporary teeth. The developing papillæ become depressed in the surrounding mesoblastic tissue, become

FIGURE XXXI.

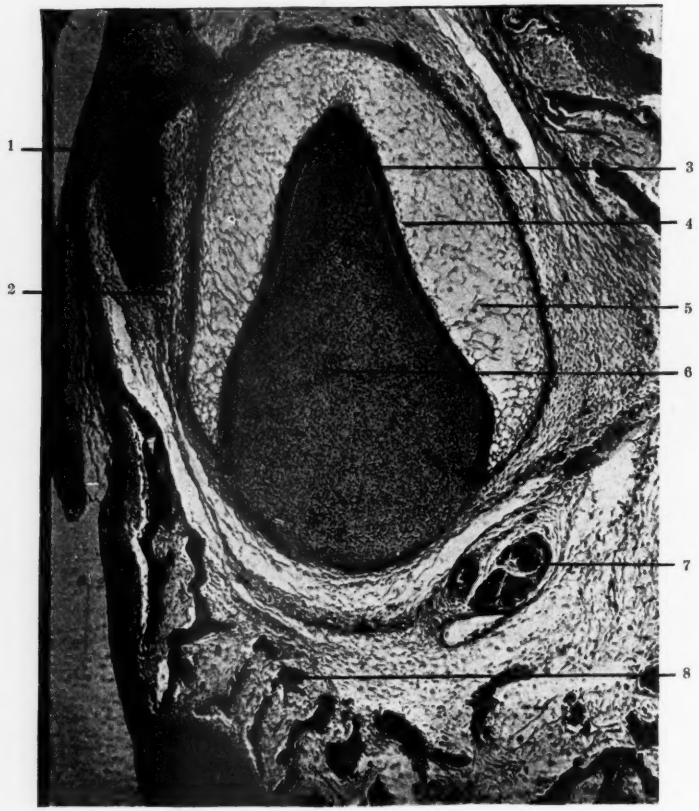


Figure 31. Same as Figure 30, under high magnification. (1) Enamel organ of permanent tooth. (2) Cells out of which dentin germ of permanent tooth will be formed. (3) Stratum malpigii. (4) Stratum intermedium. (5) Stellate reticulum. (6) Dentin germ. (7) Inferior dental vessels. (8) Developing bone.

elongated (Fig. 29, low power; Fig. 30, high power), pear-shaped, and as they come in contact with the resisting and upward developing dentin germs they become at first slightly flattened at their

base and then infolded, the depression being as before at the lower central portion of the forming bud. By this time the upward development of the sacculus has severed the permanent germ connection

FIGURE XXXII.

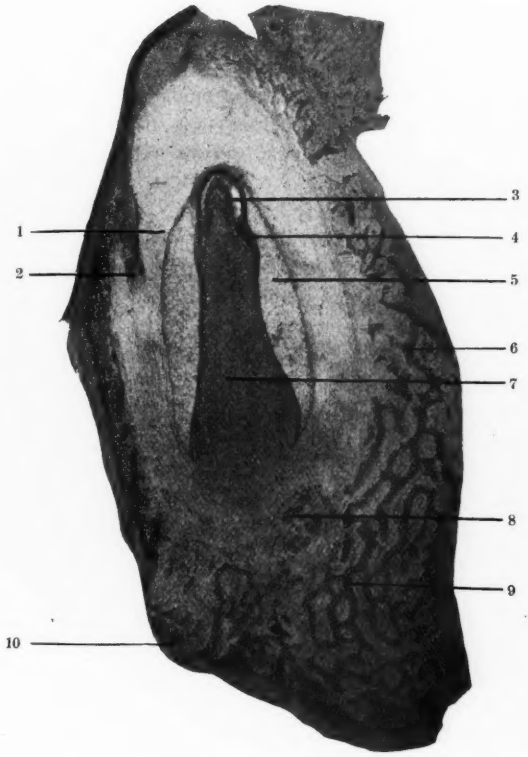


Figure 32. Cross section through inferior maxilla in the region of the central, showing the enamel organ of the permanent tooth almost completely separated from the deciduous enamel organ. (1) Small thread of epiblastic cells connecting the two enamel organs. (2) Enamel organ of permanent tooth. (3) Calcified dentin. (4) Odontoblasts. (5) Stellate reticulum of enamel organ. (6) Alveolar process. (7) Dentin germ. (8) Inferior dental vessels and nerves. (9) Bone. (10) Meckel's cartilage.

with the deciduous enamel germ, and leaves them connected by a long epithelial cord (the original cord of the deciduous tooth) with

the original epiblastic tissue lining of the oral cavity. Figure 31 shows nicely the two germs connected by a very delicate thread of epiblastic cells, while in Fig. 32 the connection with the deciduous teeth is completely severed. The germs of the permanent teeth are now in exactly the condition of the original deciduous tooth germs. They pass down along the lingual aspect of the temporary teeth and go through exactly the same changes noticed in connection with the temporary teeth; becoming invaginated by contact with the upward developing dental papilla, first capping it, surrounding it and completely inclosing it, and becoming cut off from the epiblastic cord by the upward development of the dental sacculus, which develops up and over the enamel organ, inclosing it and completing the formation of the dental follicle. The epithelial cords usually degenerate and break up into a number of epithelial whorls, but in some abnormal cases give rise to tertiary teeth in an exactly similar manner as described in connection with the development of the primary and secondary teeth.

The follicle being thus completely formed, gradually sinks deeper and deeper into the surrounding connective tissues until, becoming gradually surrounded by the forming bony tissue (Fig. 33), it comes to occupy a position, in the incisor somewhat lingually, in the bicuspids immediately beneath the corresponding temporary tooth (Figs. 33, 34) which it is to replace in the adult condition. The dental follicle of the permanent tooth when thus completely formed is similar to that of the deciduous, and its further development corresponds exactly with that of the development of the deciduous follicle.

Changes in the Lower Jaw Outside of the Follicle.—Concurrently with the changes which have led to the formation of the dental follicles, numerous other changes have taken place in the original mesoblastic tissue cells which constitute the inner of the two original germ layers of the lower jaw; changes leading to the formation of the lower jaw in its fully developed condition.

Meckel's cartilage is a temporary structure appearing as a rod or circular band, composed of cartilage cells and functioning as a temporary support to the lower jaw, sustaining its weight and shape previous to the formation of bone proper, and degenerating and gradually disappearing with the first signs of true bone formation. It arises from the mallei (one of the three bones of the ear) on either side of the head at about a time which marks the first infold-

ing in the formation of the deciduous enamel organ. It develops from behind forward in the form of a circular band, straight through

FIGURE XXXIII.

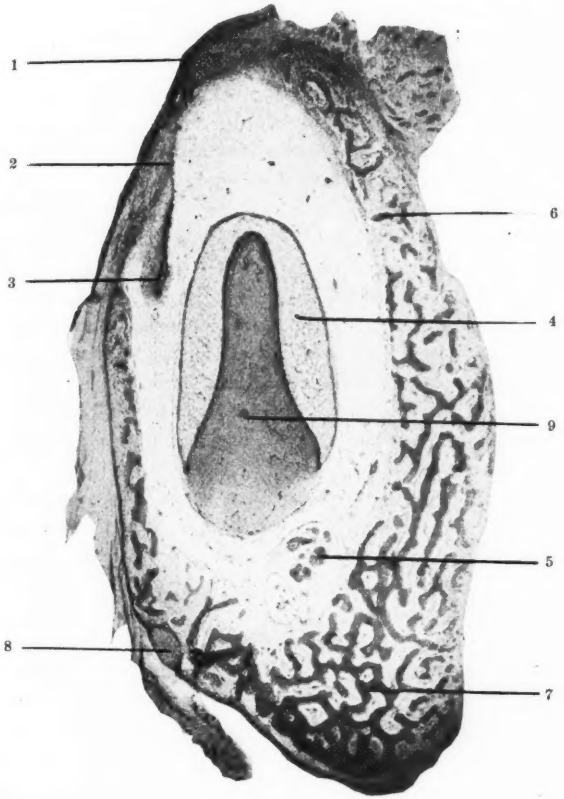


Figure 33. Cross section through the inferior maxilla, showing the complete separation between the two enamel organs. (1) Surface epithelium. (2) Enamel cord of permanent enamel organ. (3) Enamel organ of the permanent tooth. (4) Enamel organ of the deciduous tooth. (5) Dentin germ. (6) Alveolar process. (7) Developing jaw bone. (8) Meckel's cartilage. (9) Inferior dental vessels.

the central portion of the mesoblastic cells of the forming lower jaw to a point of union in the anterior median line. It at first

occupies a central or medium position in the lower jaw (Fig. 11), and then as the jaw develops and enlarges buccally with the deposition of true bone it gradually recedes, giving the impression of migrating lingually before the advancing columns of forming bone, growing smaller and smaller (Figs. 14, 17, 18, 21, 23), and finally disappears completely at a point which will mark the position of the future mylohyoid groove of the inferior maxilla, it being undoubtedly intimately associated with the formation of this groove. Figs. 31, 32 show the cartilage just before its disappearance.

The different stages in the formation of bone proper are shown in Figs. 10 to 35. It is formed from the mesoblastic tissue, being deposited buccally at first, and then extending around lingually it gradually forces Meckel's cartilage to the periphery of the forming jaw bone. It then spreads upward and inward, gradually closing in upon the forming tooth follicle (Fig. 23). At the same time the follicle itself, continuing to grow and extending laterally, the wall of the forming tooth tends to approximate the internal or alveolar surface of the forming bone, until finally they are separated only by the external layer of the dental sacculus, which blends and unites with the forming periosteum within the alveolus to form the peridental membrane.

In the same manner the permanent tooth becomes completely surrounded by the developing bony tissue, and thus, inclosed in a bony wall, it becomes completely shut off from the developing deciduous tooth, the presence of the permanent tooth in this lingual position accounting for the greater thickness of the alveolar process in this location.

The inferior dental vessels and nerves, first clearly shown in Fig. 21, develop likewise from the original mesoblastic tissue immediately beneath the forming deciduous tooth. The forming bone gradually closes in upon these vessels and nerves, completely surrounding them (Fig. 23) to form the inferior dental canal, and as the bone closes in upon the roots of the teeth, these vessels and nerves are said to give off small filaments through the surrounding bony process, which, entering the tooth at its apex, communicate with the vessels and nerves of the pulp, thus supplying the tooth with nourishment and nerve force.

The developing permanent teeth lie lingually and somewhat above the inferior dental vessels and nerves (Figs. 33, 34), and therefore

not in a direct line with the connection between these structures and the deciduous teeth, and so in the later eruption of the permanent

FIGURE XXXIV.

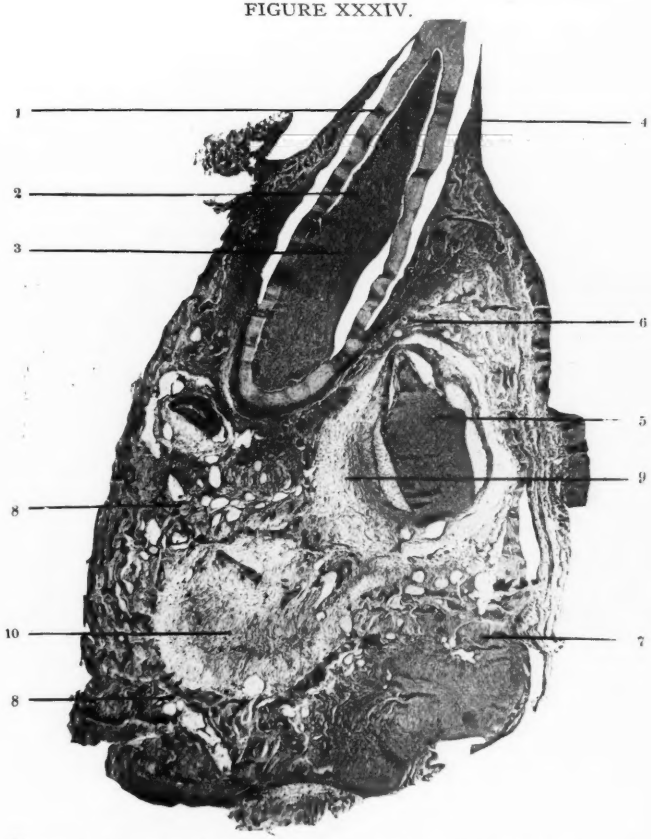


Figure 34. Cross section through the inferior maxilla in the region of the lateral incisor, showing the deciduous lateral just erupting and the permanent lateral sinking into its position beneath. The final location of the permanent tooth will be seen to be already prepared for the tooth germ, which will be entirely surrounded and inclosed by bony tissue, the bony socket being almost completely formed in this specimen. (1) Calcified dentin. (2) Odontoblasts. (3) Dentin pulp. (4) Alveolar process. (5) Dentin germ of permanent tooth. (6) Bone separating deciduous from permanent tooth. (7) Developing maxilla. (8-8) Bony socket of permanent tooth. (9) Dental sacculus of permanent tooth, showing its blood vessels. (10) Future location of permanent tooth.

teeth they can pass upward and outward into position without interfering with their future blood and nerve supply.

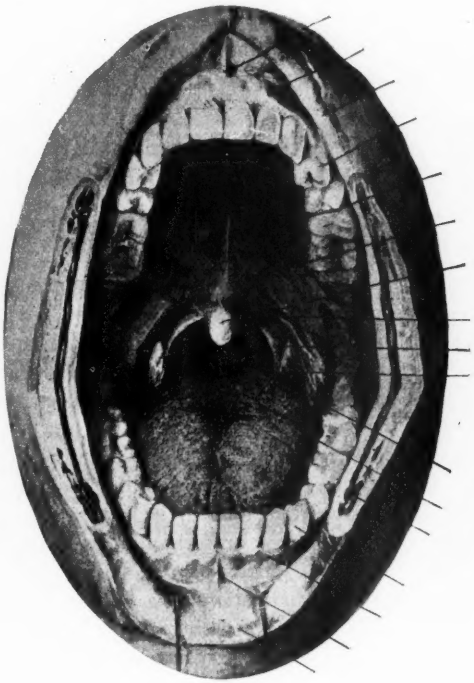
The fully formed deciduous tooth, having thus remained buried

FIGURE XXXV.

Figure 35. Showing the crown of the deciduous tooth fully formed and just erupting and its general relation to the permanent tooth beneath. (1) Calcified enamel. (a-a) Calcified dentin. (2) Developing blood vessels of pulp. (3) Developing permanent tooth. (4) Alveolar process. (5) Section through next succeeding posterior tooth, brought into this picture owing to the curve at the angle of the jaw at this point. (6) Bone. (7) Fully developed bone immediately beneath deciduous tooth.

within the substance of the forming maxilla for a period of over twelve months, during which time it has gone through its *formative or changing developmental condition,* and now being thus almost completely surrounded, i. e., laterally and inferiorly, with hard resisting bony tissue, continues to grow, and developing in the line of

FIGURE XXXVI.



least resistance, i. e., upward, cuts through the connective tissue above and erupts through the overlying layer of epithelial tissue in the oral cavity (Figs. 34, 35, 36).

So that in its fully developed condition we have the tooth lying in its hard bony socket, the latter extending outward as the alveolar process of the maxilla to the lip furrow, and inward to the tongue furrow, being separated from them by a layer of transformed connective tissue, now known as gum tissue. This gum tissue, which

is the upward extension of the peridental membrane, is covered over by the membrane lining the oral cavity which passes downward into the gastro-intestinal tract and outward over the lips, becoming continuous and homologous with the external epithelial integument of the body.

Immediately beneath the temporary teeth lie the inferior dental vessels and nerves, giving off small filaments upward which supply the teeth with nourishment and nerve force, while above and somewhat lingually lie the germs of the forming permanent teeth, each below the particular deciduous tooth which later it is to replace.

ELECTROLYSIS FOR THE TREATMENT OF PERIDENTAL INFLAMMATIONS.

BY A. H. MACPHERSON, D.D.S., PHILADELPHIA. READ BEFORE THE PENNSYLVANIA STATE DENTAL SOCIETY, JULY 12-14, 1904.

Electrolysis comes to our profession as a new treatment for inflammations arising in the peridental membrane. It simply does its own work, with no tendency to crowd out other curative agents. Immediate relief may be given in all stages of inflammation; if little or no pus has formed electrolysis will hasten the formation and draw it to the surface. Where there is much swelling and accumulation of pus electrolysis will cause the pus to discharge where the electrode is placed; the swelling will disappear, the muscles relax, the flow of blood will be increased, and pain will cease. Where there is intense suffering from pyorrhea the treatment will give immediate relief and remove any accumulation of pus. Electrolysis is the dissolution of a chemic compound by an electric current. The current passing from the positive pole to the negative pole goes through resistant tissue, stimulating the flow of blood or foreign matter that may exist in its path. The blood-vessels keep the blood from coming to the surface, while pus, which is found in a free state, will flow where the electric current may direct. The direction of the current is toward the negative pole and nothing can prevent its progress. Pus that may exist in the body will be found and brought to the surface where the negative electrode is placed.

One hundred volts will destroy tissue, while it requires only from five to twenty volts for this work. Electrolysis has been

used by the medical profession for the past twenty-five years for the removal of tumors, superfluous growths and birth-marks. This method was discovered by Mr. F. Geiger, an electrician of Philadelphia, who has had many years of experience in medical electricity. For fifteen years Mr. Geiger has applied electrolysis to relieve abscessed conditions of his teeth, and has always found relief from untold suffering.

Electrolysis is master of the situation, and its work is thorough and complete, marvellous as it may seem. This wonderful power we are permitted to control, and by it relieve days of suffering. The operation is from fifteen to twenty minutes' duration and almost painless. Electrolysis used in dental practice stimulates the flow of blood, and the patient realizes the good effects through the entire system.

Electrolysis may only be used from a series of batteries giving a moderate amount of voltage without a series current controller. The amount of current is obtained by a cell selector, or the electric-light current may be passed through a genuine shunt controller. The positive pole is applied with a sponge at the nerve-centers at the back of the head, or preferably held in the hand, any rings worn being first removed; the negative electrode is applied where it is desired to remove pus.

The polarity should always be tested where the electric-light current is used. Turn on all the current and place the poles in a glass of water; the negative pole will produce bubbles. Should the positive pole be placed over the abscess the pus will be scattered and drain into the system.

What proof have we that it is pus may be asked. By the relief given, by the quick healing of an abscess, and by chemical analysis made by Dr. I. N. Broomell. The patient then treated had been suffering severe pain in an inferior cuspid which was badly decayed. The doctor—my patient—said, "If the pain does not stop in the next two hours I shall have the tooth extracted." The tooth had been aching for twenty-four hours, with no sleep for the sufferer. The question presented itself, Has pus formed? A member of the society standing near suggested that no doubt there was some formation of pus. There was no swelling and little or no soreness about the tooth. I applied electrolysis, and in less than five minutes there was pus discharging at the negative elec-

trode. The application was continued for about twenty minutes, twenty-four volts being used. More than a spoonful of pus was removed and the pain relieved. Mr. Geiger claims great results are yet to be attained by electrolysis. It is an easy and simple operation for him to cure a boil on the neck, and he has done it scores of times. What is more wonderful, he believes it possible to cure blood-poisoning and lockjaw, and would gladly put his belief to a test. I have found electrolysis to be a friend in need many times. Its influence is for good, as it stimulates the dentist to more exacting and thorough work and greater faith and confidence in his efforts to become a master of his profession.

Discussion. *Dr. H. N. Young,* Wilkesbarre: The essayist did not mention one instance which he related to me, of a man who was unable to open his mouth or move his jaws, but who was cured in a very few minutes by the use of this agent.

Dr. J. C. Hertz, Easton: I have been much interested in electrolysis for producing anesthesia in removing pulps.

Dr. Macpherson: Mr. Geiger has taken a case where pus was discharging at one arm, and by putting the positive pole there and the negative pole on the other arm he has drawn the pus, which was almost on the surface of the one arm, through to the opposite arm and made it discharge in one application. I have used electrolysis in a blind abscess and drawn the pus to the surface in four or five minutes. Less than a month ago a patient presented with two central incisors that had been dead many years. He had been a great sufferer from neuralgia and troubles of the nose, and I believed same came from the two central incisors. I tried to draw the pus to the surface by other methods and failed, but electrolysis did the work in a few minutes. Some one asked whether the negative electrode is a metallic point or a sponge, and I would reply that it is the former. I cover one-half of the positive pole with sticky wax, that half being against the lip or cheek, and by so covering it you place all the power where you want to have the discharge. This pole must be held in firm contact with the tissue, for a slight touch will simply burn it, and when properly held there is very little pain. My first patient was one of Dr. Shoemaker's. There had been a discharge and an opening at the second bicuspid. I applied the apparatus to the first bicuspid, and in a few minutes

the pus came through the gum. There was no return of the trouble to that tooth, and it healed without other treatment.

Dr. P. B. McCullough, Philadelphia: If nothing will resist the current, why is the blood not carried to the surface and exuded with the pus?

Dr. Macpherson: I think the blood is thoroughly protected by the blood vessels, and the force used—from six to ten volts—is not sufficient to break them.

Dr. Joseph Head, Philadelphia: If electrolysis is capable of drawing the pus from one arm through the body into the other arm, I should think that unless the greatest precautions were taken there would be danger of septicemia through the entire system. It is a well known fact that if you press a septic carbuncle out into the tissues you run a serious risk of causing general poisoning.

Dr. Macpherson: Mr. Geiger thoroughly knows the risk he runs in making such experiments, but he has the inventor's spirit and did what was mentioned simply to show the power of electrolysis.

Dr. H. C. Register, Philadelphia: I do not see how pus that accumulates in one part of the body, particularly where the lymphatics are, can be drawn from that region to another without great danger. I believe a great deal of good can be obtained therapeutically from electrolysis, and I know of several cases where benefit has resulted from its use, but that it will act so quickly as described by Dr. Macpherson is a great surprise to me.

Dr. H. N. Myers, Wilkesbarre: Does the hole or the opening made by the exudation of pus when electrolysis is used heal as readily as when the knife is employed?

Dr. Macpherson: Perhaps in some cases the opening may not heal so quickly, but it will heal more thoroughly because you have absolutely removed all the pus that was there. A woman patient recently presented so weak that she could scarcely make the trip to my office. The trouble came from a superior bicuspid and the electrode gave almost immediate relief. As soon as the pus came out the whole physical system reacted and the woman left my office smiling and with plenty of vitality. Two days later I applied peroxid of hydrogen to the socket and there was scarcely any bubbling, showing how thoroughly all the pus had been removed. The electricity not only removed the pus, but stimulated the blood to its normal condition and caused a healthier flow to the part.

Dr. J. T. Lippincott, Philadelphia: After the application of the electrode and the exudation of pus is there any flow of blood?

Dr. Macpherson: There is no sign of blood, simply, I suppose, because there is no severing of any tissue, and, as before stated, the blood is so thoroughly protected by the blood vessels. The electricity simply acts on the pus, which is in a free state.

Dr. George W. Warren, Philadelphia: In poulticing to bring an abscess or a boil to a head we have a rupture of the mucous membrane. With electrolysis is there any rupturing of the membrane or is there a forcing apart of the cells of the tissues? Also, is there any destruction of the soft tissue? Is the pus brought out at several points or only at one? If only from one, I should judge that there is more or less rupturing of the capillaries.

Dr. Macpherson: The opening is not larger than the point of the instrument, and there is no destruction of the soft tissues, as only six or eight volts are used, while it takes one hundred to destroy tissue. It is my belief that there is no rupturing of the membrane, but simply a forcing apart of the cells of the tissues.

Dr. Register: I remember an experiment quoted by a German pathologist, who took a large culture of bacteria and subjected it to many thousand pounds pressure, until he squeezed out the juice from the bacterial contents. He placed some of this excretion in a sugar solution and found it produced fermentation as quickly as the original bacteria. Abscesses come from a condition that has broken down the white corpuscles of the blood and formed there an area of disease. To effect a cure we must remove the pus and in some way kill the germs, otherwise pyemia follows. From Miller's experiments with bacterial life I have obtained the impression that you could pass a current of electricity through germ cultures and still not destroy their energy, but if this electrolysis will remove the pus and kill the germs it is going to upset many theories that have heretofore been received as facts.

Dr. G. L. S. Jameson, Philadelphia: As regards drawing pus from one side of the body to the other, I don't think we run a risk, because the pus does not reenter the circulatory system, but merely follows the outside of the vessel walls.

Dr. Lippincott: It seems to me that the question Dr. Head raised with regard to the danger of drawing pus from one side of the body to the other would not apply to the use of electrolysis in

the mouth, because there we make the application directly to the point where the pus is located. Furthermore, one reason why there would be no bad effects from drawing the pus from one side of the body to the other by electrolysis is that by this method every particle of the pus is withdrawn from the body, and as the pus is not located directly in the circulatory system of the blood vessels, but in the tissues surrounding them, it would have little chance to get into the circulation.

Dr. Warren: Many of us have seen cases where alveolar abscesses formed from dead pulps in the lower teeth and opened out on the breast or neck. In these instances the pus followed the line of the muscular or connective tissues, and physicians frequently treated the patients for other troubles, but the cause of the disturbance lay in the teeth.

Dr. Rene Anema, Holland: It seems strange to me that no blood comes, and I should like Dr. Macpherson to describe the clinical aspect of that opening.

Dr. Macpherson: The point where the pus comes through is so small that practically there is no opening apparent to the eye. However, where there is a boil or a large accumulation of pus you get a decided opening, as the core comes out after the pus. In such cases a white scar shows just like the burn from a hot iron, but there is no discharge from the opening as there is after the lance has been applied.

A Member: The negative pole being the hot end of the current it will burn, and we know how often we burn the cheek with cataphoresis. While Dr. Macpherson may have what is termed pus at the negative electrode, I believe it is generated there. I account for the pus leaving the place where it manifested itself by saying that it was driven into the circulation. I don't believe there is such a thing as driving pus from one part of the body to the other. To stop neuralgic pain, make a loop around the tooth with a piece of fine platinum wire, bring the ends together and attach them to the negative pole, cover the wire with some gutta-percha so that it will not touch the cheek, and place the positive pole in the hand or on some other part of the body. Use about five or six volts and you will be surprised to see how soon the pain will be relieved.

Dr. Macpherson, closing discussion: To relieve neuralgic pain Mr. Geiger applies the negative pole saturated with water and

covers as far as possible the side of the jaw, instead of applying it at one point, and in such cases there is immediate relief. If you apply a strong current for a sufficient length of time from the positive pole to the point where the pus exists you can break it up and scatter it through the system, but if you continue to increase the power and length of the application you will simply drive it to the negative pole.

DENTAL HYGIENE OF MOTHERS AND THEIR OFFSPRING AS IT SHOULD BE PRACTICED TODAY.

BY HARMON R. SOULEN, D. D. S., PHILLIPS, WIS. READ BEFORE THE SOUTHERN WISCONSIN DENTAL ASSOCIATION, AT JANESVILLE, JUNE 8-9, 1904.

The topic which I have selected is one of the greatest importance to our profession to-day. Modern dentistry is preached and we hope it is practiced, but in order to practice what we preach we must date back to the child before it is born. Hygienic conditions must be observed from the first period in order to attain the results which our Creator intended for us. Let me briefly cite a few facts that may prove of benefit to all of us.

It is a lamentable truth that too little attention is given to the hygienic surroundings of the pupils in the schools, and by far too little to the nature of food and the manner of eating it. The aim often seems to be to so prepare the food that it will require little or no mastication before it is swallowed, and when solid food is taken it is not sufficiently masticated to properly prepare it for the digestive organs. Some years ago a friend requested several of his patients to report to him as to the number of bites required to masticate different foods. He especially desired to learn how much less children chewed food before swallowing it than their parents. He received reports from one hundred and fifty intelligent people, and learned that the practice in this regard varied greatly, and that children generally were entirely too apt to bolt their food. To encourage the habit of chewing it more thoroughly he advised that the children be given chewing-gum, much to the disgust of many of the parents. He thought the habit of swallowing food before

it was properly masticated was the cause of insufficient nourishment in many cases.

One of the chief duties of the dentist is to remedy the ravages of dental caries and to use all possible means of averting it. "An ounce of prevention is worth a pound of cure," and this is especially so with the teeth. Various digestive changes are constantly going on in the mouth. Starch is being converted into sugar, and lactic and other acid fermentations are always taking place. The particles of food which lodge in the interstices between the teeth form a pabulum for the habitation and multiplication of microorganisms, which turn the food into a fermenting mass, and this, being of an acid reaction, is highly deleterious to the tooth structure. This is especially so in filthy mouths, in which fermentation and putrefaction are allowed to continue undisturbed.

To combat these forces it is needful that the tooth germ should have the proper constituents supplied for its growth and calcification, both before and after birth of the child. Here it might be well to mention some of the bone-forming agents to use. Personally I have had the best success with the use of Syrup Hypophosphites of Lime (Plain), a teaspoonful after meals. This is to be given to the mother after the third month of conception, and to the child after it is three months old, dose accordingly. Phillips' Syrup of Wheat Phosphates is also very beneficial. The diet of the mother should as far as practicable include such elements as are suited to the nourishment of the bone-forming substance of the teeth, with what is required for the general support of the child. Wholemeal bread is preferable to ordinary white bread, from which all the tooth and bone-forming constituents of the grain have been eliminated. It is chiefly the outer portion of the grain that contains the tooth-forming phosphates, and these are generally discarded in the manufacture of flour, so as to produce a whiter article. That which is discarded is full of nutriment for the teeth; that which is retained is little more nutritious than starch. Oatmeal and like substances are valuable articles of diet for tooth and bone-forming purposes.

After birth the food should be of the necessary character to produce well-calcified teeth, for the few short years of childhood settle the quality of the teeth of a lifetime. The best diet for the infant is the natural milk and later cow's milk. Milk has been said to be "the food prepared by Nature for the maintenance of the young,"

and as it contains most of the substances needed in the formation of the teeth, as well as those for the general welfare of the child, it should be the staple article of diet during infancy and its use should be continued throughout childhood and youth. When the child is old enough the use of oatmeal and whole-meal bread as a part of the daily diet will tend to produce teeth good in structure and well-calcified, and therefore resistant of decay. As the dentin and tooth pulp always exert vital action against caries, diet is of importance throughout life to the welfare of the teeth.

The most essential agent in the preservation of the teeth is cleanliness, for so great are the powers of the factors of decay that unless kept clean and aseptic the best of teeth will be likely to fall a prey to caries. To a pleasing and agreeable expression of the face a clean and healthy denture is of the greatest consequence. We all know the difference between a clean and an unclean mouth. The clean mouth, with its bright looking teeth free from deposit, will look pleasant even though the teeth themselves may not be regular, and the gums will be healthy and the breath pure and sweet. The unclean mouth, on the other hand, contains dull, dirty teeth, covered at the margins with tartar, the gums are reddened at the edges and soft and spongy, and the breath—well, most of us can speak from experience on that subject after our extraction mornings, and the less said the better. So that for both the preservation and appearance of the teeth it is of the greatest importance to pay attention to cleanliness. A person cannot be brought too early into habits of strict cleanliness; a tooth brush can scarcely be placed too early into the child's hands, with instructions how to use it.

The Prophylactic tooth brush, of medium size and stiffness, should always be kept in the open air, and never be shut up in a closed case. It is useful to have an alternation of two or more brushes in use at a time. It is hardly necessary to say that the teeth should be cleansed night and morning, especially at night, for if this is not done the particles of food are left undisturbed for some hours to ferment and putrefy and exert their deleterious action on the teeth. The practice of giving children a biscuit or something sweet on going to bed must be strongly condemned, as it fills the interstices of the teeth with highly fermentable material, which remains to continue its injurious action while the child sleeps.

The movement of the tooth brush should not be so much the usual

horizontal action, but an up-and-down motion, sweeping the debris from the gum margin to the crown. In the former movement the spaces between the teeth are hardly touched, indeed, debris is often swept into them, while in the latter the interstices and all parts of the teeth are cleansed. Patients should be made aware of the fact that they are, or ought to be, cleaning the teeth not for appearance so much as for preservation, and that it is essential to brush the back teeth as well as the front and all surfaces.

ROOT INFECTION, WITH SPECIAL RELATION TO PRESSURE ANESTHESIA.

BY RODRIGUES OTTOLENGUI, M. D. S., NEW YORK. READ BEFORE THE WISCONSIN STATE DENTAL SOCIETY, AT MANITOWOC, JULY 19-21, 1904.

The disease which dentists are most often called upon to treat is located at the apices of the roots of teeth. In its various phases we have acute pericementitis, chronic pericementitis, alveolar abscess without fistula, alveolar abscess with fistula, chronic alveolar abscess, caries of the process, necrosis, antral diseases, septicemia, and occasionally death. Truly an important series, and if we consider that the primary cause of them all is death of the pulp, followed by apical infection, we recognize that the title of this paper brings us face to face with one of the most important problems in the entire sphere of dentistry. And when attention is called to the fact that within the past few years a new treatment of the pulp under pressure anesthesia has come into vogue, that this method is becoming increasingly popular, and that it carries in its train entirely new possibilities in root infection, I think you will agree that this discussion is timely.

Dentists should of course be prepared to treat any condition of root infection which is presented, but more than all it should be their duty, when a tooth is brought under their care in a healthy state, to make sure that no infection obtains through faults of theirs, either of omission or of commission. The subject then divides itself into two classes: teeth already infected, and teeth not infected but which may become so during dental manipulations. As I am confident that I am addressing a body of skilled practitioners, I may pass over the first class, and ask your in-

dulgence while I report a few of my own observations and studies of the second class during the past two years.

Various writers for a number of years have preached the importance of sterilization of instruments, and we can not deny that such precautions are both wise and necessary, but is this sterilization wisely conducted? That is to say, is the greatest care taken where the greatest care is needed? Let us consider. I believe it is the common practice, where instruments are sterilized at all, for the office assistant to remove all instruments which have been used during an operation, place them in a sterilizer for a definite period, remove and replace in the dental cabinet from which they are taken when required for service. I would submit that this procedure insures cleanliness, but that it does not sterilize in the surgical sense. Let us for a moment study the action of the general surgeon and learn wherein our system differs from his. The cleansing of his instruments after operation is the same as that of the dentist, and they are returned to their places in the cabinet in the same fashion, presumably clean. But in the presence of an operation these presumably clean instruments are removed from the cabinet, placed in the sterilizer, and there kept until called for, when an assistant with hands moist with a sterilizing fluid passes them to the surgeon direct from the sterilizer, and he uses them wet with the sterilizing fluid. The frequent use of the words sterilize and sterilizer in this paragraph is intentional, that your minds may differentiate between surgical sterilization and ordinary cleanliness.

Is this extreme precaution required of the dentist? Not in all cases. The claim made by some that the extreme of sterilization is obligatory in all instances is absurd, and it is the more ridiculous because, so far as I have seen, these extremists have never yet pointed out where the greatest precaution is required or may be obtained, nor do I believe that these self-same preachers protect their patients where protection is most called for. For example, let us consider the use of a few instruments specifically. Take our pluggers. The skilled dentist so manages the point that it never directly touches the tooth. He packs gold with the plugger and is careful that gold shall always supervene between the point and the tooth. How then may infection be transmitted with a plugger, even though by chance it should touch a tooth, pre-

sumably isolated by the dam? Why then any need of sterilization? Naturally pluggers should be cleaned, and it is well enough to boil them with the others, but true sterilization is not required. If cavities are to be properly cleaned the dam should be in place, but this is not always possible, and therefore excavators, burs, etc., are often contaminated with the oral fluids, blood, carious debris, etc. Thorough boiling of these therefore is more essential, but the cleansing thus obtained is probably all that is required. When we consider the use of scalers, often used in pyorrheal conditions, lancets, bone burs, etc., we reach the realm of surgery and should follow in the surgeon's footsteps. Certainly in a real operation, such as opening and cleansing an antrum, all instruments used should be handled with sterilized hands, preferably wet, and with instruments fresh from the sterilizer. My own method is to steep a napkin in the hot sterilizing fluid and lay this on the bracket stand; on this instruments taken from the sterilizer are placed ready for use, and as soon as used are dropped back into the sterilizer for instant boiling. This, however, is surgical work, and the technique is or should be fully comprehended.

Is there a set of instruments used solely in dental operations which is especially likely to transmit infection? There is. I believe the danger of transmitting such diseases as syphilis by the dentist has been much overrated, while the most common dental infection, by which I mean infection caused by the dentist, has been too little studied. The instrument, in the barbs of which lurks the secret foe, is the canal broach. I have seen an ordinary, bright steel needle dipped in pus, wiped on a napkin, stuck once in sterilized gelatin, and within a brief period a fine colony of germs has been seen to grow. Bear this in mind and think of the barbed broach, used in some foul canal, and later employed to remove a pulp from a healthy tooth. Is it not a self-evident proposition that if this is done, and it is a grave question whether it should be, it is absolutely the dentist's duty to thoroughly sterilize that broach between the two operations? Is it done? Can it be done? These are pertinent questions, and I regret that I am not prepared to make final reply, but I have some suggestions.

About two years ago this question occurred to me with unusual force. I was ill at that time, and my physician took a drop of my

blood for miscroscopic examination, that he might determine whether he was dealing with typhoid or with grip. The precaution impressed me, and regretfully I came to the conclusion that dentists are altogether too self-reliant. Dental diagnosis is made too often by inspiration. In the dental mind an abscess is an abscess, but is this true? It is not. I have learned that the germ cause of the so-called alveolar abscess may be some cell which readily succumbs to medication, or it may be one which apparently will resist any of the usual so-called germicides, used as dentists employ them. Could we not imitate the physician and the surgeon, and occasionally obtain the assistance of a bacteriologist to determine just what form of abscess confronts us? I think advancing dental science may bring us to just this sort of cooperation in our work. It is a theme worthy of deep thought, and I hope that some of our dental bacteriologists will accept this as a hint and work out the problem for us.

Recovering from my illness, I sought and obtained the cooperation of a bacteriologist in Brooklyn, Dr. Birchmore, in order to carry out a few experiments. The final outcome of this joint work was far from satisfactory, as may be learned by reading the paper of Dr. Birchmore and the discussion which followed, both of which will be found in the *Items of Interest* for August of this year. But here let me briefly relate what was attempted and the few clinical facts which were brought out. My purpose was to submit for bacteriological investigation a series of broaches, of which the clinical uses and histories should be kept by myself, that the bacteriologist's report could in no way be accused of the taint of foreknowledge. There was the chance that these experiments would fail because at least twenty-four hours would elapse between the use of the broaches and their receipt by the bacteriologist. It is of vital interest therefore to record at once that this did not prove to be the case, as Dr. Birchmore found that cultures could be obtained from infected broaches one hundred hours after their use. Thus we see at once that tooth roots may contain quite vital germs. Can roots of this character be actually sterilized with the agents usually employed and in the brief time commonly allotted to the work? Is immediate root filling always admissible, as some claim? I ask the questions; let the bacteriologists reply.

Dr. Birchmore supplied me with sterilized glass tubes sealed at either end. My procedure was to boil a new broach in a solution

of soda in water, at the same time boiling a pair of tweezers. The broach was taken from the boiling solution with the tweezers still wet and placed in a broach-holder. A broach was used only once in a canal, and then the end of the glass tube was removed, the broach dropped in by loosening the nut of the holder, and the end of the tube resealed by holding it in the flame until the glass fused. Thus I think every precaution was taken to make it certain that any infection present came from the root and from no other source, as, for example, the hands, or the end of the wire brush used for cleansing a broach. The first three broaches sent to Dr. Birchmore brought back a report that greatly impressed me, as he obtained virulent cultures from two broaches, but could get nothing from the third. Yet the first and second had been each used but once in a canal, while the third had been used repeatedly in the same canals. The first was employed to remove a putrescent pulp from the distal root of a lower molar. The second took away the pulp from the mesial root of the same tooth. These pulps were torn away from the barbs with the sterilized tweezers and the broaches placed in the sealed glass tubes. Lastly, a third broach was used in the attempt to sterilize the two canals. This was dipped each time in Shreier's sodium-potassium preparation, and from the report of Dr. Birchmore it would appear that the sodium-potassium mixture not only sterilized the canals, which gave no further trouble after one treatment, but it sufficiently sterilized the broach so that without boiling cultures were unobtainable.

It seems to me that even the meager results here obtained are of the highest importance, and I draw the following conclusions: First, even new broaches should be sterilized. Dr. Birchmore reports that he has obtained cultures as readily from new as from old broaches. Second, since cultures may be obtained a hundred hours after use, the most thorough system of sterilization should be utilized; and certainly the two facts show that the broach must be sterilized just prior to use, or else during use, as by charging it with the sodium-potassium paste, should Dr. Birchmore's report be substantiated by further experiments. As the present report, that of failing to obtain a culture, depends on only one experiment, and as we have learned that various bacteria of varying virulency may be present, it is doubtful whether even this powerful germicide may always be relied upon for instrument sterilization. It is also a question,

worthy of experimental investigation, whether simply boiling a barbed instrument suffices. If so, the method to be pursued is at hand. We should have a sterilizer just large enough to carry a few broaches. This should be on the operating bracket, and the broaches should be taken direct from it when used in a tooth root. It would be best to use a broach in only one tooth, thus avoiding the need of protecting the next patient from the disease of the preceding operation. If, however, it can be shown that this boiling process may be ineffectual at times, then I have an alternative suggestion, though some of our chemists must advise us how it may be done. It is the practice of surgeons to keep ligature sutures constantly in a disinfecting fluid. Can we find such a medium in which it will be possible to keep broaches constantly immersed? Here we cannot be too cautious, as we must beware of anything that will attack the integrity of the metal, for it would be quite as bad to leave a part of the broach in the canal as to risk infection from a possible germ. The latter we can generally treat and cure, the former accident often proves irremediable.

In the earlier portion of this paper I said that this discussion is particularly timely because a new operative treatment of the pulp is becoming increasingly popular. I allude to pulp extirpation by pressure anesthesia. This is more nearly surgery of the pulp than anything we have heretofore practiced, and it is unfortunate that a few extremists are preaching universal success with this method. Success in so far as pain may be controlled, yes, but that is insufficient. Those ignorant of the possible consequences should be warned, in the interests of their patients and in the interest of a mode of operating which promises so much, that it should be properly studied so that it may be properly applied.

I have already read a paper before the Northern Ohio Dental Society (DENTAL DIGEST, Sept., 1904, p. 1081), pointing out some of the disagreeable sequellæ which may attend this operation. At this time I shall only allude to a few facts therein mentioned and discuss them in their relation to our present topic. In that paper I stated that I believed the cocain is actually carried into the tissues of the pulp, but expressed this merely as a belief, declaring that I should require more time for further investigation, with the privilege of reversing these views. The basis of my belief depends upon the examination of a number of pulps with the microscope.

It has seemed to me that by allowing a pulp removed under pressure anesthesia to dry, I can then distinctly see crystals of cocain with a two-thirds objective. If a solution of cocain be made and a drop placed on a slide, so soon as the moisture has evaporated the cocain will be seen deposited in crystals on the slide. If the cocain solution used in connection with the anesthetization really enters the pulp, it is conceivable that after dessication the crystals will be found in similar manner. The specimens which I have examined appear to me to contain these crystals, but I am not prepared to announce this as a proven fact, for work with the microscope is not without its difficulties. Often when we imagine that we see something it may be misconstrued, and another microscopist might call it something else. It is not impossible that what I have taken for crystals of cocain may be air bubbles, and these may be caused by the forcible extruding of the blood when the pulp is torn away. We know that pulps removed under cocain are white, that is to say, bloodless. My idea therefore remains to be proven by further study, perhaps with the assistance of the polariscope.

At least it is a highly important point, thus far entirely overlooked by the advocates of cocainization, for if it be a fact that the solution is actually taken into the pulp and carried along the blood tracts, at once we see the importance of a sterile solution, and of precautions against the possible contamination of even a sterile solution when placed within a cavity certainly infected. If this solution follows the blood tracts, is it not reasonably certain that some of it may be carried beyond the apex, there to remain when the pulp is torn out? What then? May it not be that here we have an explanation of the tenderness which often supervenes? May this not explain pericementitis and alveolar abscess, which have been the unfortunate experiences of myself and others who have confessed as much to me? Is it not mortifying to see an abscess on a root which was certainly not infected when placed in our hands? Should we not know more of this, and as soon as possible work less empirically?

There is another aspect of pressure anesthesia to be considered. Heretofore in pulp removal under arsenic we have taken out the pulp in a morbid condition. By the new method we remove it while still alive, and there is a consequence with which we must reckon, as we may have a primary hemorrhage. Let me differen-

tiate here. The pulp being forcibly removed, with a torn end, the vessels empty themselves as the tissue is drawn forth, the blood remaining in the canal. This may be considerable in quantity, but even so it is not a hemorrhage. As soon as this pulp blood is removed, if a continuous flow supervenes, then we are in the presence of a real hemorrhage, and here I would suggest that it is a mistake to attempt to staunch this too suddenly. Should any of the cocain solution with its possible infectious material have been carried beyond the apex, this hemorrhage might return it to the canal, from which it may be washed. It is wise then to allow a free flow for a few minutes. At the end of a reasonable period, the hemorrhage having been arrested, I believe that it would be a hazardous procedure to undertake immediate root filling. Dealing with a patient of hemorrhagic diathesis, secondary hemorrhage is another possibility. This I am convinced is a very real possibility. In cases where the primary hemorrhage has lasted for ten minutes before being finally controlled I have dressed the canals with a dry dressing, and at a subsequent sitting have found such dressings saturated with blood, and their removal has been followed by fresh bleeding. What will occur in such cases where the canal is filled? Evidently the blood cannot escape into the canal, and consequently a clot will form about the apex, and this clot may become infected. Even should infection not ensue the clot will cause irritation and tenderness until absorbed, which may take days or even weeks.

This clot may receive infection in various ways. Should there be pus in the neighborhood, as, for example, from a pyorrhea pocket, the germs could migrate through the cancellous tissue towards this inviting pabulum. We are told that the germs often are carried in the blood, and this must be true, to account for abscesses which have no external source of contamination. We are also told that the leucocytes have the function of digesting these floating germs. Is it not evident that the germs escaping with the blood which forms the apical clot under discussion, freed from the attacks of the leucocytes, would readily begin to colonize?

A third danger from pressure anesthesia is the anesthesia. How may we know when a pulp is torn out at just what point it separates from its connections with the tissues outside of the canal? I have made it a practice to examine pulps with a magnifying glass, in the hope of determining certainly whether or not the entire

pulp has been withdrawn, but only where every slender and long tendril has been seen have I felt at all certain that nothing remained within, for, remember, we no longer have sensation to guide us. Let me suppose a case, and it is no fancy picture I assure you. A pulp is painlessly removed to the satisfaction of both operator and patient. Further probing elicits no pain, and as far as instrumentation can inform us the canal is empty. At the second sitting, when we anticipate filling the canal, we pass in a broach and get distinct response. Something is alive up there—very much alive. This is annoying because there are three contingencies: The pulp may have broken within the canal and it is a pulp terminal which you are touching, or it may have come away entire and your broach may be pricking the pericementum just at the foramen, or lastly, the broach may be passing through and touching the tissues beyond the apex. It is only the first condition with which we are now concerned, and here I will relate an experience. Some months ago I removed a pulp under pressure anesthesia from a single-rooted upper bicuspid. Apparently it came away entire, and as there had been no pain, and bleeding quickly ceased, I was strongly tempted to fill the root at once. Conservative practice prevailed, however, and I merely applied a dressing. At the next sitting the patient reported that the tooth had been entirely comfortable. Imagine then my surprise to find it excruciatingly sensitive at the apex within the canal. Root filling being entirely out of the question, another dressing was inserted and further operation delayed for a week. At the third sitting the tooth was found insensible at the apex, but to my amazement I found on the broach the real end of the pulp—a piece actually measuring four millimeters in length. Had immediate root filling been practiced, under what seemed to be a valid supposition that the pulp had come away entire, that remnant of pulp would certainly have caused me regret.

As I should not point out a difficulty without suggesting a remedy, let me say that where there is the slightest doubt about the complete removal of the pulp, realizing that as the parts are insensible we cannot have the assistance of painful sensation as a guide, I use the Schreier paste, sodium and potassium, for this not only acts as a disinfectant but will destroy any remnant of pulp.

DETAILS OF PORCELAIN INLAY WORK.

BY E. J. EISEN, D.D.S., MILWAUKEE. READ BEFORE THE WISCONSIN STATE DENTAL SOCIETY, AT MANITOWOC, JULY 19-21, 1904.

It will be the purpose of this paper to state facts regarding porcelain inlay work without resorting to theory or advancing the merits of any particular material, it being of little consequence to the individual worker in this particular field whether he advocates high or low-fusing body. Results are obtainable with both, with a slight advantage accruing to high-fusing material, the lighter colors of which are more translucent. As far as strength is concerned, there are only a few high-fusing bodies which outclass certain low-fusing ones.

The fundamental principles in this work are the same for all cases: First, we should consider cavity preparation, second, obtaining the matrix, third, insertion of the filling. Those who advocate cavities possessing advantages for retention base their argument upon something more than the ability of the cement to retain the inlay in place. So much has been written upon this subject that I will refrain from going into detail regarding this particular branch of the work. It remains for the individual dentist to learn and choose from experience to which factor he will give credit for the retention of an inlay, to either the adequate cavity preparation, or to the adhesive property possessed by cement.

In regard to the advantages of cavities shaped upon mechanical lines, I may say that their construction is as easy or easier when once mastered than that of any spherical cavity. It is much easier to withdraw a matrix from such cavities because there is little or no line which is inaccessible.

In taking up the advantages of both I will first advance the merits of platinum over gold matrices. Platinum as it is furnished us to-day of several thicknesses, namely, .001 and .002 of an inch, is most perfectly adapted for all classes of work, whether for low or high-fusing, the thickness of the platinum having absolutely nothing to do with the ultimate adaptation of an inlay. If a cavity is constructed correctly compensation for the detached matrix is taken up to the greatest possible degree and the space remaining is necessary for occupation by cement. It would seem unwise to do

away with this space entirely while we are compelled to use oxy-phosphate of zinc as the agent for retention. Some day when our present agents are improved upon, or an entirely new substance is invented, it may be well then to do away with this space occupied by cement.

For a simple approximal cavity, labial or lingual aspect, or a labial cavity, it is well to use the thinnest platinum obtainable. As a rule these cavities are moderately small, and it is therefore unnecessary to take the force of shrinkage of the porcelain into consideration. Should the cavities be very deep and large the shrinkage of this body would tend to warp the matrix towards the largest diameter of the body of porcelain. In compound proximo-incisal cavities, where the shrinkage of the body is influenced from several centers, the platinum should be thick enough to withstand these forces. Should the platinum of .002 be used in such cases the shrinkage will so warp it as to make an imperfect fit at one of the terminal walls of the cavity.

The platinum of both gauges is worked in practically the same way. In the majority of cases it will be necessary to anneal the platinum three times—before using, after the first burnishing, and after the second burnishing preparatory to its last treatment, which should consist only of packing against the walls of the cavity with spunk. If any burnishing with instruments is attempted prior to the final removal of the matrix it will be found that this will spring it. This is especially noticeable in compound proximo-incisal cavities.

All trimming of the matrix, so that it will lie flat upon the tray, should be done prior to the second annealing. Having the matrix well trimmed is most necessary in an incisal restoration, as the entire porcelain body should lie flat, with no portion more prominent than the other. Should this precaution be neglected the different degrees of heat on the floor and roof of the furnace will result in an improper fusing of the entire mass. Probably the greatest trouble with low-fusing bodies arises from this cause. If a matrix lies flat the current may be turned off at the proper moment and all parts of the body will fuse at the same temperature.

In considering a gold matrix one can begin and end by recognizing its only advantage—that of being more easily burnished. A gold matrix must of necessity be invested, and while this in itself

is no serious objection, if one takes into consideration the time required it will be found that more than half of the time taken in making an inlay is consumed by investing and cooling the investment, which latter is necessary after each baking before any additional body can be added. The entire procedure of gold-matrix inlays seems a waste of time, as better results in the majority of cases may be obtained by the use of platinum. A platinum matrix held in the pliers is much more easily controlled than a clumsy disintegrated investment. An invested matrix also presents the disadvantage during the building of an inlay of being placed in such a position as to obstruct the view of the margins and prevent the free removal of any excess of the inlay material. If we take this objection into consideration and wish to remedy it, it becomes necessary to allow the matrix to overlap the margins of the cavity to a considerable degree, and as a rule an excessive overlap of matrix makes its removal more difficult. It must be admitted that some of the results accomplished by using gold for the matrix are equal to anything accomplished with platinum, but they have been obtained by the waste of a corresponding amount of time.

The insertion of the finished inlay presents few difficulties, but certain rules ought never to be overlooked for this critical operation. The rubber dam should be invariably applied when it is at all possible. As an advocate of etching versus cutting of undercuts in the inlay, I would call attention to a little feature of the etching process which is very important. When the hydrofluoric acid is to be removed it is well to do this with alcohol or water instead of using a solution of bicarbonate of soda upon the surface of the inlay, thereby neutralizing the glacial phosphoric acid of the cement. This will also cause an imperfect chemical union of the cement itself and make the surface of the inlay unsuitable for any inherent adhesion of the cement. It has been recommended to moisten the inner surface of the inlay with phosphoric acid in order to secure a closer union with the cement. If this is done I am convinced that the results will be gratifying. Your attention is also called to the undesirability of using any cement which noticeably expands in setting, or one which forbids its yielding under pressure when the inlay is forced to place.

TREATMENT OF PAIN FOLLOWING EXTRACTIONS.

BY CHAS. B. ISAACSON, M. D., NEW YORK. READ BEFORE THE ALUMNI ASSOCIATION OF THE NEW YORK COLLEGE OF DENTISTRY, 1904.

Some four years ago I was called in consultation to a patient who was suffering very serious consequences from the extraction of teeth. There were two physicians and a well-known surgeon treating the case, and it was at the request of one of the physicians, an old friend of mine, that my opinion was asked. I dissented entirely from the methods pursued to relieve the patient, and at the same time maintained that the condition arose more from the sharp serrated points of the alveolar process, pure traumatism, than from infection from instruments, which was claimed. The question then arose what authority there was on like cases or cases arising from the extraction of teeth. As I had been more or less familiar with these conditions for years, and had been called repeatedly in consultation for advice, I had made it my business to pursue a rigid investigation into such information as had previously been published, but the diligence of my search was surely worthy of better results. There is no subject in dentistry which has been touched upon less or to which so little special attention has been given as this condition, which we will term "after-pains." Here and there in a desultory way suggestions of methods and remedies have been made, but in all of them, so far as my research goes, there has never been any attempt to fathom the causes and approach the condition radically.

In a second consultation on the same case, after I had been given my own way and had relieved the patient from pain, one physician asked me why I did not write an article and give some suggestions to the medical fraternity on this very subject, as he admitted they were all densely ignorant of what to do, especially when several dental practitioners had been baffled. I then wrote a short article, without any technical terms, trying to condense the matter in such a way as to reach the comprehension of any medical practitioner. Upon the request of my friend, Dr. Deane, with whom I have had several consultations on these matters, I have revised my article and present it to you this evening.

This condition of after-pains generally arises one or two days or even weeks after the offending organs have been extracted. The

symptoms vary in intensity from many causes, as well as from constitutional conditions, which must be recognized in each case. I might say that the direct physico-pathological causes have been dimly recognized, and relief is sought by the usual antiseptic measures, which in insignificant cases may be successful. It would behoove us to recognize certain constitutional conditions, and an inquiry into the history of the patient may become a guiding star for our diagnosis and modus operandi. By this I mean that the cachexia from typhoid and eruptive fevers, the anemia and dyscrasia of Bright's disease, and the ill-conditioned state of the reparative forces in diabetes should be recognized. I state this because I have seen dental practitioners very much baffled because they had neglected to make an inquiry into the history of their patients.

I also claim that local applications of cocain and solutions to highly inflamed tissues are reprehensible, for tissues in that condition do not absorb the medicament, and the danger of a harmful quantity of the drug being swallowed is great. Here I might offer a few suggestions, namely, that it would be advisable before using cocain hypodermically to make a few inquiries into the constitution of the patient. In Bright's disease, diabetes, and in cases of tobacco heart cocain should be used very charily, and should be guarded against by the employment of the physiological antidotes, such as nitroglycerin, strychnin, small doses of morphin, Hoffman's anodyn and whiskey, before the drug is injected. The use of adrenalin as an adjunct to cocain has its decided merits, but as it increases arterial tension in weak hearts it is very apt to cause syncope, especially in diabetes and Bright's disease, and although the sequelæ from the use of this drug might be alarming, in my experience so far they have not proved fatal.

I cannot deprecate too strongly what may be called the wanton use of hot poultices on the face. It seems as if the intervening thickness of the facial muscles is entirely ignored, while the result obtained is only the further infiltration of pus, and the extension of the inflammation to tissues which had been entirely normal, thus causing the original trouble to be exacerbated. In some cases it may be necessary to use heat in order to lessen the tension, but surely it is only logical to apply the heat directly to the parts affected, which can be done very easily by using pledgets of cotton steeped in hot water (one or two per cent solution of carbolic

acid is suggested), or a hot infusion of camomile flower. Here I wish to state that I have found cold packs if not contraindicated at least of little avail. Perhaps I have not been judicious in the use of cold packs, but in all cases where I have used them or where they have been used stasis was caused, the reparative forces were impeded, and no results were obtained, whereas when the tension was greatest I have always obtained relief by hot infusions of camomile flower.

It would be well for us to bear in mind the anatomy of the superior maxillary, especially that part which comes directly in connection with the conditions which I am about to describe, namely, the alveolar process, which may be described briefly as a mass of cancellated porous bone, wedged in between several processes. The porosity of this process is the cause of manifold trouble, and yet, strange to say, very grave inroads are sometimes made ere the patient is aware of any serious difficulty, whereas in the inferior maxillary the alveolar process is a small ridge of much denser structure and gives rise to decidedly painful symptoms as soon as any invasion has taken place.

Now I wish to enumerate a few possible causes of after-pains, and at the same time suggest the means of relieving the same—

1. Retention of the pyogenic membrane in the socket.
2. Distension of the osseous walls.
3. Fracture of the alveolus.
4. Sundering of the maxillary processes and alveolus, with accompanying laceration of the tissues.
5. Retention of roots and spiculæ in the socket.
6. That particular condition of the alveolus and septum from which the gum tissues have been denuded by the encroachment of salivary calculi.
7. Inflammation of the tissues from necrosis, caused by the undermining of the alveolus from perforations by pus, from long-standing pyorrheal discharges, and alveolar abscesses from old roots.

1. *The retention of the pyogenic membrane in the socket.*—The retention of the pyogenic membrane is generally followed by acute pain. When a tooth with septic pericementitis is extracted the pericementum may or may not be attached to the root. As the teeth are associated with their alveoli, through the medium of a

coarse, resisting fibro-cellular tissue, the chances are that as plastic exudations have taken place the pericementum will adhere to the lining membrane. The sepsis usually penetrates into the apical space, and therefore pain and inflammation, almost like the beginning of an alveolar abscess, ensue. In order to relieve this condition it is necessary to remove all clots and curet the socket as far up into the apical space as possible. For this a small blunt curet or preferably a rose bur in the dental engine should be used. As a soothing application I have found the following prescription very effectual, used on the tampon in the socket:

℞. Mentholis,
Acidi Carbolici,
Tinct. Iodi .....aa ℥i.
Etheris,
Chloroformi .....aa ℥ss.
M.

After curetting it is necessary to irrigate the socket with some antiseptic lotion, or peroxid very dilute, or any other medicament preferred by the practitioner, and pack the socket with sterilized gauze.

2. *Distension of the osseous walls.*—This condition will require careful examination, is usually met with when the tooth has been difficult to extract on account of the unyielding walls, and is generally most noticeable when the lower third molars have to be excised from the thickened alveolus. In order to make this matter clear I will assume that there are three possible causes for the severe pain arising in such cases. In the first place, when the outer or inner wall has been bent out of position by the force necessary to extract the tooth we find certain irregularities of the alveolar ridges which are a source of irritation. By curetting the irregular edges, compressing the parts, thoroughly cleansing the socket, and packing it with sterilized gauze good results may be obtained. These cases heal slowly and require absolute cleanliness, the position of the cavity being unfavorable to rapid healing. The next two conditions are caused when considerable force has been used in extracting the tooth, by which the outer or inner wall may have been luxated or fractured. Then a greater inflammation ensues, which may develop into two conditions. The first I will term for convenience traumatic alveolitis, meaning that an intense inflamma-

tion has arisen from surgical intervention and that a considerable area of the tissue around has been affected, and associated with it is the sympathetic inflammation of the sublingual and submaxillary glands. The pain in this condition is more localized and the tension is high. There is a comparatively small quantity of pus, considering the intensity of the inflammation. Now as this cavity is a veritable catch-all for mucus, food, and unhealthy granulations, it is possible that it might merge into another condition, which I will term osteomyelitis. This is where the sepsis has been established, either owing to neglect on the part of the patient or mismanagement. Knowing the ease with which infected pus diffuses itself through the tissues, we may expect to encounter a septic invasion of the glands through the lymphatics, where in the former case we have only a sympathetic inflammation.

Now I wish to call your attention to the differential diagnosis between traumatic alveolitis on the one hand and osteomyelitis on the other. In the former we have a high tension, intense pain, sympathetic swelling of the glands, but in a large number of cases no temperature to speak of, whereas in the latter we have a distinct series of symptoms, ushered in by chills, rigor, and a decided rise in temperature. The cultures from infected glands show long-chained streptococci in superabundance. In traumatic alveolitis relief can be obtained by a thorough curetting of the irregular edges, cleaning of the socket, obtaining as smooth a surface as possible, irrigating carefully, and packing with iodoform or aseptic gauze dipped in orthoform or nosophen. In order to relieve the high tension in these cases I recommend the use of hot infusions of camomile flower. In osteomyelitis the same course is to be followed. For the swollen glands I have used an ointment of the following prescription:

℞. Icthyolis,
Ung. Hydrarg. Ammon.....aa ℥i.
Potassii Iodidi .....℥ii
Ung. Zinci Oxidi.....℥i.
M.

In both cases I would suggest a careful inquiry into the constitution of the patient. It is always advisable to collaborate with a physician or surgeon, especially where there seems to be a danger

of the spreading of an infection through the glands and tissues, causing a septic cellulitis or Ludovic's angina. I urge this because the prognosis in these cases is sometimes not favorable and requires surgical intervention from without. Moreover, the laymen are very apt to censure the dentist for allowing them to get into such a condition, forgetting their own neglect, for it seems beyond their comprehension to understand why so small a matter as the extracting of a tooth should lead to such serious trouble. The ointment which I have recommended has a decided healing effect, and in a large number of cases I have obtained resolution without a breaking down of the tissues by suppuration. When, however, the infection has proceeded beyond the power of the leucocytes, the high temperature on the one hand and the intense swelling of the glands on the other indicating a pointing of the abscess, it is advisable to aspirate and remove some of the pus. I have had signal results from aspirating and gently syringing out the cavity with phenol sodique. This operation avoids the disfigurement caused by a great many surgeons who think it is necessary to make a crucial incision or one an inch long. I again repeat that the constitution of the patient should be recognized in these conditions, for in chronic nephritis, Bright's disease and diabetes these cases may prove fatal. I have always used a thermometer as a positive guide for a differential diagnosis between traumatic alveolitis and septic osteomyelitis. In the former we have the pain of the parts affected, together with the sympathetic inflammation of the glands, with hardly any rise in temperature, whereas in the latter we have a more copious discharge of pus and greater infiltration of the glands, and no doubt a septic invasion of the system affected through the lymphatics.

I wish to emphasize that I have always been suspicious of cases in which the alveolar walls have been luxated, and always feel more confident when I have removed that part.

3. *Fracture of the alveolus.*—This will require removal of the fractured bone, smoothing of all irregular points by curetting thoroughly, irrigating and treating antiseptically. It is always well to renew the tampons in the socket from day to day, until we know healthy granulations are forming.

4. *Sundering of the maxillary processes and alveolus, with accompanying laceration of the tissues.*—These will present to the

practitioner the appearance of a large surface intensely inflamed. Like all tissues the gum forms a cicatrix, which exerts considerable pressure, and thus in trying to contract over these sharp points the gum becomes intensely inflamed, and pus forms and burrows underneath, forming in pockets, which of course become readily septic. There are also irregular flaps of gum which do not unite and thus contribute largely to the septic condition. They should be cut away. This condition arises some time after the tooth has been extracted. It is only the very serious cases which I have in mind here, for usually the gum will stretch over the sharp points of the alveolus, and aside from the pain upon pressure the patient has no other discomfort. Practitioners generally remove these points when inserting a denture. The treatment in these cases is to relieve the condition of tension by one or more incisions parallel to the axis of the maxillary, and then with the curet, or better still with the bur, all irregularities of the alveolus and maxillary processes should be cut away so that the surface is entirely smooth. A thorough irrigation of the parts and packing them with sterilized gauze will bring about good results. In deeper cavities I have used almost every remedy recommended, but have found that none possessed the analgesic properties of iodoform, and though it is so objectionable by reason of its odor, it seems to do the work.

5. *Retention of roots and spiculæ in the socket.*—When there is retention of roots and spiculæ in the socket the cavity is to be cleansed of the spiculæ, and if the root cannot be removed by forceps, or is too small to be grasped, it can be burred out. The removal of these foreign particles and the packing of the cavity with the usual antiseptic measures will very easily relieve this condition.

6. *That peculiar condition of the alveolus and septum from which the gum tissues have been denuded by the encroachment of salivary calculi.*—This condition is a peculiar one but is very easily recognized and diagnosed. It occurs mostly with teeth which have become elongated from want of antagonism; the roots are more or less exposed, and deposits take place on them, pushing the tissues farther up from the alveolar wall and leaving it and the septum denuded. After extraction the gum refuses to cover the necrotic wall and septum—hence painful results follow. These

teeth, becoming loosened, are often pulled out by the patient himself. Relief in such cases is very easily obtained by cutting away the dry, friable, necrotic bone until healthy bone is reached. In using the dental bur the tactile sense must be relied upon; the decayed bone gives way under the bur like plaster or hard chalk, and we should not feel satisfied that our work has been thoroughly done until the bur meets the resistance of the healthy bone.

7. *Inflammation of the tissues from necrosis, caused by the undermining of the alveolus from perforations by pus, from long-standing pyorrheal discharges, and alveolar abscesses from old roots.*—When repeated perforations have taken place in the alveolar wall it may be assumed that the nutrition of this bone has been largely interfered with, impaired or arrested, and that the wall thus undermined will eventually become a sequestrum. This condition in a large number of cases takes place long after extraction. An exploratory incision through the inflamed tissues will reveal a necrosed wall, and the diagnosis is easily made. The removal of the sequestrum and a careful curetting and smoothing of all the irregular parts will bring about good results.

In all these cases mentioned the superior maxillary presents us with examples due mostly to neglect. The pain in such cases in the superior maxillary is not sufficient to cause any positive annoyance, so great inroads will have been made ere the patients seek relief. Therefore when they come under our care we may find considerable sepsis, and as these conditions take place a long time after removal of the teeth the dentist receives a good deal of censure for having extracted the teeth so brutally and so unskilfully. Here I wish to say that I have sufficient respect for the ability of my confreres to know that these conditions are never produced intentionally, and that they are due to causes which may be beyond their notice at the time being, or which rise unexpectedly. Much may be ascribed to the neglect of the patient. In all these cases I have no doubt you have all had your conflicts with medical practitioners who, ignoring the causes and not being familiar with the mouth, resort to general antiseptic measures, whereas the conditions, as before mentioned, can only be known to the dental practitioner or an oral surgeon.

In performing these operations I have found it more advisable to do so by the aid of ethylic chlorid or the injection of cocain.

The use of nitrous-oxid anesthesia I have found impracticable on account of its short duration and the danger of using the dental bur in a hurry. Of course in some cases anesthesia by ether or chloroform is absolutely necessary to perform the operation thoroughly. I have not touched upon the possible inoculation from unclean instruments nor mentioned actual fractures. Such cases have to be diagnosticated per se. I have also omitted to mention the pains which may and often do arise in neurasthenic patients; pains which persist in syphilitic patients or when a tubercular invasion has taken place, and finally the vagaries of the female nervous system during pregnancy and catamenia. These require the careful attention of the medical practitioner for constitutional treatment, with the advisable collaboration of a dental surgeon. Every practitioner fastens upon some remedy which has proved faithful to him, so the selection of any preparation, from mercuric bichlorid down to boric acid and formalin solutions, is purely optional. My experience with preparations of "Ine" and "Ol" has been unsatisfactory.

To conclude, I wish to impress upon you the facts that causes must be sought after, and that symptoms should not be treated alone, that such causes are due only to foreign substances, no matter whether they are spiculæ, sequestra, fractures, tissue, clots, mucus or food retained in the socket, and that the removal of such substances and every rough edge is paramount to any local treatment that can be used.

THE GERM OF SYPHILIS. Horand (*N. Y. Med. Jour.*) states that in 1902 he discovered in the blood of a syphilitic infant germs like a small eel, endowed with a spermatozoid movement, moving rapidly about the microscopic field, and adhering to them highly refractive circular bodies. No description of these bodies was to be found in syphilitic literature, and Horand pursued his investigations alone for some time. He details his method of mounting blood for the purpose of finding this germ, which was evidently not a bacillus, a sporulated capsule, or a trypanosoma. Horand has found it near the primitive chancre, and watched its evolution in the blood and lymphatic vessels, in mucous plaques, and in secondary and tertiary ulcerations. It is found in both sexes. Horand states positively that he can make an absolute diagnosis of syphilis by examination of the blood, and believes that he has discovered a hitherto undescribed parasite of intraglobular evolutive form, a sporozoön, a protozoön, or best a hemoprotist, which can always be found near the lesion of syphilis and, in a characteristic form, in the blood of syphilitics.

Digests.

EFFECTS OF CHEMICAL AGENTS ON BACTERIA WITH RELATION TO THE SALIVA. By Geo. W. Cook, D. D. S., Chicago. Read before the Fourth International Dental Congress, 1904. In the study of the effects of chemical agents on bacterial protoplasm there are three phenomena to be considered. First, the effects of various chemical elements upon the chemical composition of living protoplasm as manifested in the modification of metabolic processes; second, the phenomenon of living protoplasm to adapt itself to chemical elements; third, the effect chemical agents display in directing protoplasmic movement (chemiotaxis).

As understood at the present time, the phenomenon of cellular activities is but a chemical change taking place in a highly complex and very unstable molecular substance, and in the living state is readily acted upon by four main groups of protoplasmic poisons, which have been classed as follows: The oxidizing agents or poisons; the salt-forming agents or poisons; the substitution poisons, and the catalytic poisons. By an oxidizing agent we mean an agent containing active oxygen which readily attacks protoplasm when brought in accessible relation to it. The second group, the so-called salt-forming poisons, are those acids or bases that enter into chemical relations with the proteid substance in the protoplasm. A chemical change is largely influenced by the quality of the proteid molecule. A number of observers have noted the fact that acids or bases will not act as readily on such proteids as keratin, fibrin, and chitin, whilst many other proteids react quickly to acids and bases.

The third kind of poisons is classed under "substitution poisons" and is grouped under two heads, the sulphur compounds and the nitrogenous substances. These have been classed by Lowe among the ketons, aldehyds, and amido groups. The majority of these compounds do not act chemically upon albumen in the lifeless state, but they act as a very violent poison on living protoplasm, which indicates that such chemical agents have a very unstable molecular grouping. The majority of the molecules, chemically speaking, are closed chains, and the poisonous effect is usually in proportion

to the number of hydrogen atoms in the molecule, and their being so combined as to give up the hydrogen, which unites with the nitrogen in the living protoplasm, so as to substitute hydrogen instead of some other chemical element in the proteid molecule. These facts have been clearly worked out by Locke, Lowe, Binz, and a great many others.

The fourth group of protoplasmic poisons is usually designated as the catalytic poisons. Their action on unicellular organisms is that of anesthesia. They are composed very largely of organic compounds of the fat series, and are usually endowed with but little chemical energy. The complexity and instability of their molecular composition is the basis of their poisonous action, and when CH_3 or C_2H_5 is added, making an alkali, the poisonous effects are increased, and as the atoms in the alkaline medium are increased, so are its poisonous effects. This is also true of the methane series and sulphuretted compounds. If chlorin takes the place of hydrogen in the methane molecule its poisonous effects are considerably increased.

The study of the action of certain chemical elements upon protoplasm, as represented in the unicellular organism, has added considerably to the knowledge of the physical and chemical properties of living protoplasm, and investigation along these lines has demonstrated that all protoplasm is not the same in its general chemical constituents. It further shows that all items in the protoplasmic body are not always essential to the life of the protoplasm, thus demonstrating that protoplasm is dissimilar in different organisms. Scientific investigation along these lines has further shown that it is possible to treat a protoplasmic body with a weak solution of a chemical agent and gradually change the composition of the organism so as to render it incapable of being perceptibly injured by a much stronger solution of the same chemical agent than would have been necessary to destroy its vital activity previous to the first treatment. The investigations on protista, by Davenport and others, have led many to the conclusion that the altered chemical constituents of the protoplasmic body will be transmitted in the division of the individual organism, and that the composition of the cellular protoplasm of the race is largely in accordance with the media in which the previous generation has lived.

In the consideration of what reagents act upon the elementary vital functions of protoplasm there are a number of things to be taken into consideration; for instance, the supply of oxygen—for it is a well-established fact that the vital activity of protoplasm cannot survive for any great length of time in the absence of oxygen. An exception to this is the anærobic bacteria, some of which are immediately destroyed in the presence of free oxygen. But it must be borne in mind that in the absence of free oxygen they obtain their oxygen from the breaking down of oxygen-containing molecules, and in this way obtain the oxygen necessary to enable them to carry on their nutritive function.

It has been determined that certain forms of the unicellular organisms are detrimentally affected when the oxygen supply is diminished. Clark and Demoor demonstrated that the protoplasm of plasmodia myxomycetes and various tissue cells must have a pressure of oxygen ranging from 1 mm. to 3 mm., and when the quantity was diminished below these points protoplasmic movements were reduced in accordance with the diminished quantity of oxygen. When the organism was held in a 0.1 or normal salt solution for from two to three hours it became inactive, and the cells showed a granular appearance, but when the normal quantity of oxygen was again applied cellular activity was reestablished—thus showing that death had not occurred in the cell, but that the organism was capable of reestablishing its cellular activity and carrying on all the functions of life.

The increase of oxygen above the normal quantity accelerates the protoplasmic activity of the cell, which causes it to assume just the opposite action to that which takes place when the amount of oxygen is diminished (Demoor and Rossbach). So it will be readily observed that the poisonous effects of any chemical agent must necessarily be materially influenced by the quantity of oxygen present in the environment in which the organism is living. Not only is the organism detrimentally affected by these chemical poisons, but protoplasmic activity of the organism may be materially increased or decreased in relation to the quantities of certain physiological elements which may be present in its nutritive media.

Ozone (O_3) is extremely destructive to bacteria in water, provided the water be free from organic substances, otherwise it kills bacteria only in proportion to the organic compounds contained in

the water and the quantity of ozone that is liberated in the water containing the bacteria. Its effects on dry substances containing bacteria are very feeble.

Hydrogen has very deleterious effects on unicellular organisms; for instance, the amœba when in the presence of hydrogen for twenty-four hours became spherical in shape and very inactive. The same was true of the myxomycetes. These cells became granular when exposed to hydrogen for forty minutes, and all cellular movements were completely suspended when the exposure was continued for a longer period. Certain motile bacteria were subjected to the same test, and, while some required more than forty minutes' exposure before becoming motionless, others lost their activity when exposed for only twenty minutes.

After considerable study the following conclusion was reached: that the difference in the time of exposure required to cause these organisms to lose their power of mobility was mainly due to the kind of media in which they had previously lived. The experiments with oxygen and hydrogen fully confirmed the ideas held by Boer and others, that protoplasm differs both quantitatively and qualitatively. Since all activities of protoplasm must take place almost entirely in water, the reagents tested were capable of absorption in water.

The bacteria used in the experiments were: Diphtheritic bacillus, typhoid bacillus, glanders bacillus, cholera bacillus, B. mycoides.

All agents acted more energetically when the oxygen pressure was reduced slightly below the normal, except the so-called oxidizing agents, and these acted more efficiently when oxygen pressure was increased; for instance, when oxygen pressure had been carried to the limit of protoplasmic endurance, and hydrogen peroxid (H_2O_2) was added, the life of the cell was quickly destroyed. The oxids of carbon (CO_2 and CO) have dissimilar effects on different bacteria. The presence in solutions of the oxids of carbon compounds have a slight influence on the death of bacteria when used in connection with other agents. If CO_2 or CO be added to other chemical agents they materially assist in causing immobility and final destruction of the bacterial cell in from twenty to sixty minutes. However, it must be borne in mind that the carbon oxids have far less influence on the physical and chemical con-

stituents of bacterial protoplasm than they do on many of the other forms of unicellular organisms, and that they have a different action on the protoplasm of different bacteria is a fact well demonstrated by Demoor.

The presence of ammonia in solutions influences the mobility of bacterial protoplasm by first increasing and finally diminishing the movements, until the organism is at perfect rest. The immobility does not signify that the life of the protoplasm has been destroyed, it has only assumed a state of anesthesia. These poisons, as previously stated, are classed as catalytic. There are, however, certain compounds which are neither acid nor basic, and which possess but little chemical energy, that influence bacterial movements very much in the same way as do the ammonia compounds. Most prominent among these are chloroform, chloral, methyl alcohol, carbon disulphid, etc. Nagel's theory is that these poisons act upon protoplasm because of the unstable condition of the molecule in the chemical agent and the reactivity of the protoplasmic substance to such agents. It must be borne in mind that these agents act by anesthetizing the protoplasmic movements, and as the quantity of the agent is increased it continues to act until the reactivity of the protoplasm becomes entirely arrested. This has been designated by some as the law of relation between molecular composition and strength of action.

In the methane series the poisonous action is increased by the addition of carbon atoms to the molecule up to a certain point; then the molecular compound becomes more stable, consequently its influence upon protoplasm is comparatively indifferent. However, if the hydrogen atoms in the molecule be replaced with chlorin atoms the poisonous properties are materially increased.

The action of the various alcoholic compounds on unicellular protoplasm demonstrates that the action is modified by the chemical constituents of the molecule in the alcohol; for instance, methyl alcohol (CH_3OH) has a weak action; ethyl alcohol (C_2H_5OH) has somewhat increased poisonous effects; while isopropyl alcohol (C_3H_7OH) is a very active poison. The action of these three agents becomes more detrimental as the carbon compound in the molecular substance is increased.

When many of these agents were confined to the saliva as a solvent medium the influence on bacteria was changed in their

general constituents more than when they were in simple solutions in water. This can be accounted for only in two ways: the difference in the density of the medium, and the poisonous effects of the agents themselves. When bacteria are confined to the saliva as a habitual medium the phenomenon of osmosis plays an important part in the organic constituents of protoplasm.

The quantitative determination of the osmotic pressure of saliva was determined by the method employed by Pfeffer, and it was found that there was a variation in the osmotic pressure of saliva obtained from different sources. It was found that in saliva, when the tension fell below 6 atmospheric pressure, the bacteria changed in their morphological appearance, assuming a form many times smaller than the original cell. When a solution of the above-named alcohols was added death of the bacteria took place in from one to three hours earlier than the same solution would produce under normal osmotic tension. This was also true of many other solutions that did not contain the alcohols above named, but in their stead chloral hydrate, chloroform, and sulfonal. The same was true when the tension of the saliva was raised above 7 atmospheric pressure. The higher the tension of the saliva the more deleterious were the effects produced by the agents. When the tension of the solution remained from 5½ to 7½ atmospheric pressure the bacteria had far more ability to withstand many of the poisonous agents than when the atmospheric pressure was reduced below these points.

The carbon oxids, which are almost constantly present in saliva, seemingly influenced the action of many agents that were tested for their poisonous effects. The tension pressure of osmosis in saliva is materially influenced by the presence or the introduction of free oxygen in the solution. It is also a well-known fact that salts of dissimilar structure have different osmotic pressures even when the molecules in both solutions are the same. This would indicate that potassium, sodium, calcium, etc., have an important influence on the osmotic pressure, as was manifested in various solutions. A 0.5 per cent solution of the following agents: potassium, sodium, lithium, ammonium, calcium, strontium, barium, magnesium—and especially the chlorids of these compounds—was found to have a beneficial influence on the growth of bacteria, but if the quantity of these salts was increased above 1 per cent cer-

tain of the bacteria were both physically and chemically changed, while other forms of bacteria would carry on all the functions of life in apparently a normal way; but when the tension of the solution was changed, or some other chemical agent was introduced into the solution, they became materially affected. This would indicate that the addition of metal ions to a solution increases irritability in the protoplasm of the cell without changing the morphological appearance to any great extent. On the other hand, it was easy to demonstrate that if the quantity of metal ions was diminished below 0.5 per cent the irritability of the protoplasm was diminished, as was also its power of resistance.

Tests were made to determine the difference, if any, between the action of solutions of the heavy metals on the growth of bacteria in bouillon and in saliva. In this connection it might be well to state that there is a wide range of variation in the action of the salts of the heavy metals on bacteria when grown in saliva. A solution of these compounds that would affect the same quantity of bacteria growing in bouillon, in a great many instances would have but little effect on the same organism growing in saliva. There was an indication, however, that the saliva was more easily decomposed; in other words, it seemed to be more unstable in its molecular composition than the bouillon, although there is a great difference in the osmotic pressure of saliva and bouillon.

However, the soluble inorganic compounds in saliva cannot be exclusively taken into account for the changes that sometimes take place in salivary secretion, for it has been found that by preparing a solution containing all the constituents of saliva, as estimated by various authors, there was some difference between the morphological and pathogenic properties of some of the organisms grown in the artificially prepared saliva and that which was obtained from the human individuals. It was also found that certain poisonous agents introduced into both the artificially prepared saliva and the natural saliva differed very materially in their effects upon certain bacteria. This indicated that in some of its characteristics an artificially prepared saliva differs from the normal saliva. The saliva, however, obtained from one individual gave a growth of bacteria that answered pretty closely to the artificially prepared solution.

Of course it must be borne in mind that there are certain soluble organic substances in natural saliva that must necessarily differ somewhat in different individuals. B. pyocyaneus formed pigment in the saliva of eight persons out of ten, yet at no time were we able to produce the characteristic coloring matter of this organism in the saliva of the two remaining persons, but the characteristic pigment was produced in the artificial solution. If asparagin were added to the artificial solution the peculiar pigmentation was produced in great abundance. It was also found that potassium sulphocyanid seemed to play some role in the number and pigmentation of bacteria of both the artificially prepared saliva and that obtained from natural sources. This indicates that the cyanogen compounds play some part in the growth found in certain chemical solutions, and that bacteria differ in their reactivity to the agent, this depending upon the microorganism used. It is important to bear in mind a well-known experimental fact, previously mentioned, that all living protoplasm is influenced in its life-processes by the media in which it has previously lived.

We have called attention to the oxygen pressure as well as that of hydrogen—two chemical elements that play an important part in the physiological function of protoplasm whether it be in the unicellular or in the multicellular organism. But one of the most important features as regards the life and functional activity of bacteria relates to the mineral constituents of the media in which they grow; for it has been recognized by Vaughan and others that these inorganic salts play an important part in the life of the microorganism, and the change in the tension of the solution may cause plasmolysis of the bacteria, or alter its chemical constituents. We proved in our experiments that a hypotonic or a hypertonic solution leads to a greater or less degree of injury to the bacterial cell—a phenomenon that has for a long time been recognized. Therefore a colloidal solution like the saliva, having the inorganic salts enumerated in the list here following, would be considered isotonic to the cell wall in the case of most bacteria. But it is a demonstrated fact that the mineral constituents of the saliva have a variation of more than two per cent in different individuals. Most of the salts exist as chlorids—although the phosphates and

carbonates of calcium and magnesium are held in solution by the carbonic acid gas of the saliva:

Potassium	457.2
Sodium	95.9
Iron oxid	50.11
Magnesium oxid	1.53
Sulphuric acid (as SO_3)	63.8
Phosphoric acid (as P_2O_5)	188.48
Chlorids	183.52

And in this solution there are to be found the following organic compounds:

Mucus and epithelium	2.13	1.3	2.2
Soluble organic matter	1.42	3.8	1.4
Potassium sulphocyanid	0.10	...	0.04

The above-named substances are apparently constant constituents of the saliva. Other substances which are not normal, but traces of which are occasionally found, are urea, cholesterin, lecithin, and leucin. Traces of uric acid, biliary pigments, and sugar have occasionally been found; carbon dioxid is present in a gaseous state. All of these substances have more or less influence on the vital activity of bacteria, but with all of them we were unable to account for many of the phenomena that characterized the changes in the products of bacteria—such as toxins and acids produced or not as the case might be.

We then took up a course of experiments which we hoped might lead to something more definite as regards the changes taking place in bacteria growing in saliva. The phenomena of pleomorphism, as well as the pathogenic or the acid-producing powers of the organisms, could not always be accounted for, for the solution seemed to have a bacteriolytic action when it was minus many of the products that have a deleterious influence on the growth of bacteria, and when the osmotic pressure of the saliva was at a point where growth of the organism seemed to be about normal, the osmotic pressure was at a point ranging from 5 to 7.

The experiments that followed in the line leading to the determination as to whether or not saliva was capable of carrying from the blood bacteriolysins or antitoxic substances lead so far into the subject that it would be quite out of place to attempt to detail the methods adopted, and under what circumstances it is possible for

such substances to appear in salivary secretions. Miller and Hugenschmidt are the first to suggest or even attempt any explanation along this line. However, in 1881 Gautier found that the human saliva contained leucomains, which differed very much in their actions according to their time of secretion and the gland from which they were secreted. He at that time found that saliva contained a poisonous or narcotic substance which when injected into birds showed characteristic symptoms which indicated that the saliva contained a poisonous agent that could by certain chemical manipulations be obtained from that solution. We followed this author's experiments and obtained similar results; we also carried it farther, by trying the saliva that had been freed from its normal inorganic salts as well as bacterial organisms, and testing it in solutions containing various bacteria. On a number of these organisms there seemed to be but little appreciable disturbance; however, with such forms of bacteria as the diphtheritic, typhoid, and B. mycoides, in the saliva of three persons out of ten there was found a bacteriolytic substance. For certain microorganisms grown in saliva that was tested it proved to be isotonic. When saliva that had been freed from its inorganic salts by dialyzation was placed in solutions containing these organisms, in the saliva of the above individuals there was found to be a feeble bacteriolytic action. It must be borne in mind that these bacteriolytic complements did not destroy the bacteria at once, but when they lived for an indefinite time in the saliva containing these bacteriolytic bodies the organisms became distorted, losing their morphological appearance and also their power of producing disease, and if kept long enough in these solutions the bacilli would assume almost a coccus form and eventually die. When a number of organisms were placed together in the solution certain forms seemed to succumb to the action of the solution much more quickly than when they were placed under its influence in pure cultures. This would frequently happen, however, if the cultures were mixed in any media, but not so quickly as when in the solution of the saliva of the three individuals mentioned.

It is much to be regretted that the methods employed in this experimental work could not be mentioned more in detail, but time and space would not permit. This work has led to the conclusion that the various agents that may be present in the saliva as normal

constituents, or those that may exist there as foreign substances, have great influence on the growth and on the physiological activity of bacteria in general. It is also an evident fact that saliva will influence the pathogenic properties and the acid-producing powers of certain forms of bacteria. It also demonstrated that bacteria have the power of acclimating the organism to its environing conditions, and that this is manifested by the modification of metabolic processes, and by the movement of certain motile forms of bacteria. It also showed that a change in the physiological activity of the human individual would manifest itself in the saliva and its action on bacteria. The hope of obtaining a chemical agent that will act as an antiseptic in the oral cavity is not to be expected with any degree of assurance. All that need be expected is the mechanical removal of the bacteria present by such solutions. —*Cosmos.*

MECHANICAL THEORY OF SEASICKNESS.—That the malady known as seasickness is due to a disturbance of equilibrium is sufficiently evident, although just how this disturbance acts on the organism to produce its results has been a matter of much controversy. Under the above heading an article is contributed to *La Nature* (Paris, September 10) by Mons. R. Bonnin, in which the author, without going too deeply into physiology, explains at some length the purely mechanical factors involved in the question. He reminds us that when a body swings, pendulumwise, around a fixed point, its speed is variable. It is at rest just as it starts, moves faster and faster up to a maximum and then slows up until it stops just for an instant at the other end of its course. At any given moment it has three forces acting on it: its own weight, which pulls it directly down; the centrifugal force, directed away from the point around which it swings; and its own inertia, which acts in the direction of its motion. The first is of course constant in amount and direction, the second varies with the speed of the body, and the third with its position in its course. The result is that during its oscillation the total force acting on the body (sometimes called its "apparent weight") is continually varying both in amount and direction. This is the case on shipboard, where these variations as the vessel rolls cause great strains in the

structure of the ship, necessitating vast strength in the hull. The same is true of moorings or fastenings, which though ample to sustain the weight of a gun, for instance, may be snapped if the vessel roll suddenly.

M. Bonnin goes on to say: "Now replace such a body by a human being. He will be obliged at each instant to make efforts to put himself in balance with his 'apparent weight,' which is all the time changing in amount and direction. Again, his internal organs, suspended in the thorax and the abdominal cavity, will tend to oscillate continually, becoming displaced relatively to each other and pulling on their attachments. At certain moments the organs seem to rise, while at others they appear to grow heavier. Hence an effect of distress which may bring on nausea and is called seasickness when it arises from the motion of a ship. As the nausea results from the oscillations of the organs contained in the thorax and the abdominal cavity, we see why the horizontal position may, up to a certain point, diminish the effects of seasickness. The effects produced by pitching on variations of weight are similar but of greater intensity, especially at the ends of the vessel, where, on account of its length, the displacements, even with slight pitching, are more considerable, and consequently the tangential forces are more important. It should be added that the hypothesis with which we have started to make this explanation clearer—namely, that the oscillations of rolling and pitching take place about a fixed point—does not accord exactly with reality. There is, to be sure, a point in whose neighborhood oscillation is very slight; but experience and calculation both show that in the movement of a vessel there is no point that is absolutely still."—*Literary Digest.*

TONGUE AS A DIAGNOSTIC GUIDE. By Dr. J. W. Nieweg (*Medical Progress*). The tongue, aside from being the organ of taste, phonation, deglutition, suction, and mastication, is the bulletin upon which may be read the events that are transpiring within the body. We examine the tongue to ascertain if it be dry or moist, clean or furred, hard or flabby, pale or red. There are many conditions that will cause the tongue to become furred. Among them may be mentioned febrile conditions, hepatic disorders, disturbances of the stomach and intestines, or local causes,

such as carious teeth, neuralgia of the terminus of the maxillary branches of the trifacial, enlarged tonsils, etc. Sometimes the tongue will be furred only upon one side. In such cases we should always look for local trouble affecting the side corresponding to that of the coating on the tongue. Another not infrequent local cause is the excessive use of tobacco. If we can eliminate all of the local causes, and if there be no accompanying fever, we can specially attribute the fur to some disturbances in the primæ viæ. Often patients with a thickly furred tongue complain of a bitter taste in the mouth, especially in the morning. In such cases temporary relief can be obtained by frequently rinsing the mouth with some antiseptic solution. Potassium permanganate acts well in this connection. A dry tongue generally indicates a nervous depression. It is often accompanied with delirium of a low muttering type, especially in typhoid fever. There is a tendency for the tongue to become dry in the aged, even without any febrile disturbances.

Another type which we often encounter is the dry, smooth, glazed, or shiny beef-looking tongue. It is normally clean, and in no other disease is it so constantly present as in advanced diabetes. Sometimes we meet the above described tongue with a few prominent papillæ dotted here and there about the tip. This is the irritable tongue, the name corresponding with the state of the alimentary canal. It is often met with in dyspeptics, alcoholics, in tubercular conditions of the intestines or peritoneum, or, in fact, whenever there is a source of irritation to the alimentary canal and its immediate attachments.

Another often seen is the "strawberry tongue," which is characteristic of scarlet fever. It usually makes its appearance a few days after the onset of the fever, and is due to a desquamation of the cuticle of the tongue leaving exposed the filiform papillæ.

Sometimes we meet with a tongue that is slightly coated and covered with a slight froth, most marked near the edges. It is seen in persons with a nervous temperament, in enervated conditions from overwork or excessive mental strain—in fact, whenever the nerve energy is below par. A broad, pale, flabby, teeth-indented tongue denotes anemia and a relaxed condition of the tissues of the body. This tongue must not be confounded with the swollen teeth-indented tongue due to mercurial salivation.

Another tongue that usually gives us considerable alarm is the

septic tongue. The characteristics of this tongue are a dry and dark dorsum and red edges. It may or may not be swollen. It may be due to general systemic infection or local absorption of septic deposits about the teeth. This tongue may be considered as a grave prognostic indication.

There are many other conditions, the author states, in which the tongue acts as a valuable guide in diagnosis; for instance, the tremulous tongue seen in various forms of nerve diseases; again, the tongue of whooping-cough, with ulcers developing upon its under surface.

NEW TEST FOR BLOOD RELATIONSHIP. The term "blood relationship" has acquired new significance since it has been proved by Dr. George Nuttall that the blood of related animals actually possesses similarity of reaction that can be shown by chemical tests. Nuttall's discovery is based on recent investigations of the mechanism of immunity, in which the existence of substances called "precipitins" was demonstrated. These proteids are developed in the bodies of animals by the injection of milk, bacterial emulsions, alien blood, etc., and derive their name from the fact that a precipitate is formed when they are added to the substances originally injected. Thus the precipitin formed by the injection of milk will give a precipitate with milk, but with no other substance, and that formed by the injection of human blood will precipitate only with human blood, or with the blood of some closely related animals. This property is already used in testing for blood in forensic cases, and Nuttall saw in it a means for demonstrating blood relationship. According to him, animals are closely or distantly related as their blood yields a similar or different amount of precipitate with the same precipitin. Experiments made along this line have brought out interesting results. * * * Others are described by Dr. Nuttall in a recently published book entitled "Blood Immunity and Blood Relationship." We quote the following from a review in *Science* (October 28):

"Nuttall and his associates were among the first to see the possibility of establishing by means of the precipitin test a far more accurate scheme of relationships in the animal kingdom

than has been possible by any other method, and the results of their studies, extending over a period of three years, are presented in detail in the present volume. The elaborate scope of the work may be judged by the fact that Nuttall himself prepared in the rabbit anti-sera for the bloods of thirty different animals, and records no less than sixteen thousand tests on the blood of nine hundred animals. Only the barest outline of the many important results of this extensive work can here be indicated.

"*Chimpanzee a Close Relative.*—In general, Nuttall succeeded in establishing a close blood relationship in different classes of animals which zoologists have grouped together chiefly on anatomical grounds. Among the most interesting of these relationships is that between the Anthropoidea. It is a somewhat startling verification of the consanguinity of man and the higher monkeys that the blood of the chimpanzee gives 90 per cent as much precipitin with humanized rabbit serum as does the blood of man himself, while the blood of lower monkeys yields only one-fourth or one-third as much. The chimpanzee thus appears much more nearly related to man than to the common Rhœsus monkey. Another interesting result is the observation that anti-pig serum is remarkably diffuse in its action, affecting considerably the blood of primates, and showing that the porpoise has correctly been called the 'sea-hog.'

"Numerous conflicting results are recorded, which is not a matter of surprise, considering that the specimens of blood were collected on blotting paper, often under great difficulties, and sent by mail from nearly all parts of the world. As the author states, only a beginning of the study of blood relationships has been accomplished, and much remains to be done in determining the exact standing of different animals in their respective classes. It is of fundamental importance to have established the fact that the precipitin test is universally applicable as a method of zoological rating, and may have much influence in elucidating many problems of evolution. It may be suggested that new points of view may perhaps be secured and former results be effectively controlled by comparing the action of anti-sera for the same blood prepared in other animals as well as in the rabbit, which is the animal almost exclusively employed by workers in this field."—*Literary Digest.*

THE LOWER DENTURE PROBLEM. By L. P. Haskell, D.D.S., Chicago. The denture for the lower jaw is still the problem of the dental laboratory. I say to patients if I had no more trouble with a lower set of teeth than with an upper I should be happy, and explain to them the difference by saying that the upper set of teeth has a broad surface and is held firmly in place by adhesion to the jaw, but the lower set very often is on a ridgeless jaw, flat and narrow, with sometimes a flexible membrane over most of the surface, which is often very sensitive. In my experience a broad, deep jaw is of rare occurrence. Suction in such cases as described is out of the question. In a great majority of cases the muscles, glands and loose integuments are lifted by action of the tongue high above the margin of the jaw, so that it is impossible for the plate to be worn much below the margin, else it is constantly lifted, and of course a great annoyance.

For eight years I have had a personal experience which has been of great educational advantage. The jaw is flat and narrow. On the lingual side, although the model shows some depth, the margin of the plate has to be rounded upward to avoid displacement. I have found very few cases where the plate could be worn deep at the extreme margin under the condyles, as advised by some.

For many years I recommended and made heavy dentures (Watt's metal). The second plate made for my mouth was one of these, but it was a great disappointment. Having no ridge to hold it in place, I found upon leaning over to speak to some one its weight would slide forward, and upon lying down in bed, it slid one side or the other. I have found further that weight is not at all needed, and that rubber is practically as good as anything for the lower jaw.

Another feature of the lower jaw is in the constant absorption of the ridge, independent of what is worn upon it, so that in partial cases the teeth become too short within a year, necessitating the raising of them. As a matter of course the use of a lower set for mastication requires as a rule more time than the upper. There is a certain involuntary management by the cheeks required, which cannot be described.

Within a year I abandoned two cases where the conditions were

such that it was impossible for the patients to wear anything on their lower jaws.

My observation in a sixty-years' experience has been that there has been from some cause a great change in the condition of lower jaws from undue absorption. It may be the result of excessive pyorrheal conditions now so prevalent. Yet the same conditions do not exist to such an extent in the upper jaw, only when rubber plates are worn continually, as in those conditions the adhesion being good, the air cannot circulate under the plate, resulting in retention of undue heat, producing excess of absorption of the process.

If there remains in the lower jaw a cuspid or bicuspid which is firm I retain it and clasp. I do not deem it necessary to place an unsightly crown on it. Whenever it fails a tooth can be added to the plate. The only objection to this course is in the settling of the plate, leaving this tooth to come in contact and cause displacement. This of course is remedied by grinding it.

As the lower denture is much more liable to irritate, patients should be told it is not necessary to endure it any longer than for them to call for relief. Who can solve the Lower Denture problem?—*Brief.*

SYMPTOMS INCIDENT TO DENTITION. By Walter R. Ramsey, M.D., St. Paul. Read before the Minnesota State Dental Association, June, 1904. Until recently many of the ills of infancy, and especially those involving the digestive tract and nervous system, were attributed by the profession as well as by the laity to dentition. Within the past few years scientific research has demonstrated that many of the symptoms which were formerly attributed to dentition were due to bacteria, which gained entrance to the alimentary tract by means of infected milk, resulting often from dirty utensils. Since a more exact knowledge of the cause of these affections has gradually spread from the profession to the laity the cholera infantum of a few years ago has practically disappeared from private practice, and even in the densely populated parts of our great cities and in asylums, where formerly from 20 to 50 per cent of all infants under one year died during the hot summer months, the mortality is being rapidly decreased.

The result of the scientific crusade of the past few years has been to attribute all symptoms of a pathological character to some form of infection, and many of the leading observers have said during this reactionary period that dentition, being a physiological process, is attended by no symptoms whatever and that those appearing at this time are purely a coincidence and due to other causes. This radical stand is not now taken by the most observing of the profession, for although dentition normally is a physiological process, there is no doubt that in a certain percentage of cases symptoms of a varying degree of significance result. One authority believes from his own observation that about one-half of healthy children have no symptoms, and the remainder have some of a varying degree of intensity.

It is most essential that the normal process of eruption of the teeth be kept constantly in mind. At birth the rudimentary teeth are located in the alveolar process, so that the mucous membrane is smooth and of a uniform color. At its root each tooth is connected with a branch of the dental nerve. As the tooth begins to develop it projects itself in the direction of least resistance. The pressure from below upon the gum soon results in its atrophy, and the crown of the tooth appears on the free surface of the mucous membrane.

It is probable, as already stated, that this process is accompanied by symptoms in about one-half of all cases. They may be divided into three classes: 1. Symptoms resulting from a well-defined local inflammation. 2. Reflex symptoms resulting apparently from local inflammation. 3. Reflex symptoms where there is no apparent local inflammation. In the neurotic child especially symptoms of a reflex character are much exaggerated.

The general symptoms of difficult dentition are as follows: The child is restless and fretful; there is usually an excessive flow of saliva, but occasionally this may be diminished; the child cries, often refuses to nurse, sticks its fingers in its mouth and likes to have its gums pressed upon, or seems relieved when allowed to bite upon some hard substance. In other cases the child screams if an attempt be made to even examine the gums, and it avoids even the slightest pressure. At night it is restless, sleeps uneasily, frequently waking or crying out in its sleep, and even beating its head against the sides of the crib; there may be convulsions.

The skin is often hot and dry, and the temperature varies from 100 to 101 degrees F. in mild cases and up to 105 degrees in severe ones. There may be mild or even severe diarrhea, or the bowels may be persistently constipated. The tongue is usually coated. If there is not much local inflammation the mucous membrane may be dry and reddened, even though there is a copious flow of mucus from the salivary glands. An examination of the mouth may or may not reveal anything to account for the symptoms.

In a certain percentage of cases a circumscribed, whitish, shiny area of the mucous membrane will be noticed stretched over the crown of the underlying tooth. This area is raised above the surrounding mucous membrane, and around the base there is a zone of inflammation. Such a condition is due to the fact that atrophy has not taken place as rapidly as it should, so that the mucous membrane is subjected to pressure, resulting in an amount of pain and other reflex disturbance depending upon the amount of tension, the constitutional makeup of the infant, and other factors determined by environment.

Frequently no indication of local disturbance can be found, and nothing except perhaps the excessive flow of saliva and the general symptoms already described indicate the presence of some disturbing factor. Before any general symptoms should be attributed to dentition a most exhaustive search should be made for other causes, as in the past and even now serious conditions are frequently overlooked on account of the too-often-resorted-to explanation of difficult dentition. Eliminating all other possibilities, then, we are frequently forced to make a diagnosis by exclusion, and from the fact that the symptoms promptly disappear as soon as the tooth appears on the free surface of the mucous membrane.

How shall we explain these severe symptoms which occur with dentition? As we know, the constitutional makeup of children differs as it does in adults. The highly neurotic child will be thrown into convulsions from a slight attack of indigestion which would not at all disturb his more phlegmatic brother. We know that the secretion of the glands depends upon their nerve supply, and whether they secrete the normal amount, less or more, depends upon the inhibitory or acceleratory action of the nerve sup-

ply. Thus a diarrhea will be produced by an excessive action of the intestinal glands, a constipation by a diminished action.

More severe intestinal affections may be and undoubtedly frequently are produced by the lack of proper secretion in the intestinal tract, thus permitting decomposition of the intestinal contents to occur and an inflammation of the mucous membrane to result therefrom, with the characteristic symptoms of an intestinal infection. The excessive secretion of the salivary glands is undoubtedly due to a direct stimulation of the nerves supplying these glands, the tooth acting as a foreign body in the mouth, which, as we know, at once excites a flow of saliva. The swallowing of this large amount of saliva may also be a factor in producing the diarrhea.

It might be mentioned here that the saliva of the infant has distinctly diastatic action, which continues after it has reached the stomach for from one-half to two hours, a fact which, as Jacobi suggests, might be used to advantage when there is fever and the Hcl be consequently reduced.

The frequency with which ear symptoms are found in conjunction with teething has led to careful investigation as to the cause. I recently saw a child which gave marked evidence of having pain in the ear, and upon examination the drum was found much inflamed. This condition persisted for a week, the child suffering much pain when not relieved by local treatments, but promptly ceased when a tooth, which gave no evidence of any local pressure, came through. Such cases are not uncommon. Professor Rotch reports one case in which a muco-purulent discharge occurred as the result of an acute inflammation of the tympanum. This discharge promptly ceased when a tooth, which had given no local evidence of trouble, came through. The discharge was reestablished when the next tooth was in process of eruption and ceased again when it had pierced the mucous membrane.

That this inflammation is directly dependent upon dentition there has been sufficient attested evidence, but how can it be explained? Woakes has shown that an intimate relation exists through the medium of the otic ganglion between the nerve supplying the teeth and that presiding over the blood supply to the tympanum. Rotch has drawn a diagram showing how pressure

upon the dental nerve results in an increased blood supply to the drum, resulting often in an acute inflammation, with the production of much pain.

There are probably no means by which we can determine in a given case whether dentition shall be easy or difficult. However, by a proper knowledge of the conditions much can be done when symptoms first appear which will save these little ones great pain and discomfort, and even in many cases conditions which would otherwise result in permanent injury.

Treatment: It has been believed in the past, and is even now by too many of both the dental and medical professions, that whenever symptoms arise from teething gum-lancing must be at once resorted to. This is a serious mistake, for although there are well-selected cases in which lancing the gum gives immediate and permanent relief, there are many in which it does no good and may do actual harm. When on examination the tooth is seen to be projecting above the jaw, with the mucous membrane over the crown white and shiny, and around the base an area of inflammation, cutting down upon the crown will give great relief, as the crown will often remain in view as a result of the retraction of the tense mucous membrane. To lance a gum where there is no evidence of tension is not only useless, but it opens up a channel for infection and results in a cicatrix which may afterward transform a simple into a difficult eruption.

The symptoms referred to the ear must be treated locally. A stream of hot water, temperature of 110 degrees F., directed into the ear will often result in a cessation of the pain, or a few drops of an atropin solution, or better still, a 1-5,000 solution of adrenalin chlorid will result in a depletion of the blood supply to the drum, which usually is the seat of pain. Where the child is of the neurotic type, and no symptoms other than nervous can be detected, small doses of sod. bromid, put up in simple syrup, or small doses of phenacetin, reinforced by citrate of caffein, will give marked relief. On general principles coal-tar products should be used only with great care, on account of their depressing effect upon the circulation. When convulsions occur the child should at once be plunged into a hot bath, the head meanwhile being kept cool by a cold sponge placed on it, or better still, around the neck, and in addition a few drops of chloroform may be given (by inhalation) and other

sedative drugs designed to allay the nervous irritability administered. Where there are intestinal symptoms the greatest care of the diet should be exercised, the stools should be watched daily, and usually a markedly restricted diet prescribed. Where there is fever from reflex origin a tepid or even a cold sponge, followed by a vigorous rub, results in a lowering of the temperature and acts as a tonic to the unstable nervous system, so that the child will frequently fall into a quiet sleep and remain so for hours.—*Review.*

SYPHILIS OF THE MOUTH. By Henry C. Boenning, M. D., Philadelphia. Read before the Chester and Delaware County Dental Society, October 26, 1904. Syphilis of the mouth is of very common occurrence, and of especial interest to the dentist because of his exposure to infection. The lesions are of the most protean character; some are highly contagious; hence a discussion of the features of this disease is of the greatest practical advantage to the members of your profession. Syphilis is to-day the most commonly met and most widely distributed disease. The cause of it is a germ; this has been established beyond controversy, but whether that germ is an animal or a vegetable microorganism has not been shown. From time to time the germ of syphilis has been "announced," only to find that it fails to meet Koch's law, but eventually it will be isolated, and a new treatment, by probably an antisyphilistic toxin, will be inaugurated, to the enormous benefit and relief of the syphilitic, whose afflictions are often greater than those of the leper. Lustgarten's bacillus, supposed by many to be the cause of syphilis, failed in the laboratory to prove its claims; but with each exclusion we gain a better understanding of the action and probable identity of the germ responsible for this malady.

Syphilis is a disease of different stages. This conforms with nearly every zymotic disease in which the microorganism has been satisfactorily demonstrated; but the stages of syphilis extend over periods of months and years, whereas those of most diseases are limited to days and weeks. Thus, in typhoid we have the period of incubation of the germ, the prodromal period, the stage of invasion, the period of intestinal lesions, and the active disease, terminated at the end of three weeks, when begins the tardy and precarious stage of recovery by lysis. In yellow fever we have the stage of invasion,

often fulminant, the period of lull or abatement, often deluding the patient into the conviction that recovery has set in, only to be followed in many cases by the dreaded black vomit and death—all phases of the disease terminated in a week or ten days. In syphilis the stages and periods are as strongly marked but more greatly extended, and are viewed over a long lapse of time. They are months apart, years apart, and often extend throughout life.

Syphilis of the mouth may be of any stage—primary, secondary, or tertiary, and not infrequently we meet here also the lesions of hereditary syphilis. Primary syphilis is chancre and bubo. The initial point of infection is the chancre, and about the mouth it may occur on the lips (usually the lower), the gums, the tongue, and the tonsil. Other parts of the oral cavity, however, may be infected.

The mode of infection is direct and mediate. Direct infection means infection-contact of the primary lesion, or contagious secondary lesion, or infected blood during either of these stages. Infection is greatly facilitated if the recipient has an abrasion of the part infected; in truth, it is held by many that a surface of unbroken continuity is invulnerable to infection, but this is fallacious. A subject with abundant mucous patches of the oral cavity can convey infection by a kiss. Any number of cases of specific infection are recorded in which the subject has been infected by some vessel or agent used by the syphilitic. This is mediate infection.

One of the most extraordinary cases of chancre about the oral cavity I ever saw was the case of a gentleman of unquestionable moral integrity. The source of infection was a mystery. The chancre involved the gum near the lower right lateral incisor. After a week of the most patient inquiry he came to my office and told me that he had noticed the day previously that the clerk at the desk of the restaurant which he patronized picked a toothpick from the tray on the desk and, after using it, tossed it back. He saw him do this several times. I instructed him to notify the manager, and together they watched the cashier and saw him use toothpick after toothpick, tossing some to the floor and some back upon the tray. The young man was notified to stop the habit he had acquired, the toothpicks were removed from his desk, and at the request of my patient he was brought to me for an examination. His mouth was everywhere covered with mucous patches, and a general examination showed a virulent case of syphilis of about three months'

standing. A contaminated toothpick was in this case undoubtedly the mediate means of infection.

Primary infection, the chancre, is then the point at which the syphilitic poison is introduced. This, of course, excepts congenital syphilis. As has been said before, the donor of the disease may infect the non-syphilitic by the virus from a chancre, the virus from a mucous patch, by discharges from secondary lesions (the so-called moist, secondary manifestations), by the blood during the primary and secondary stages, but not by the normal secretions, such as the saliva or those of the skin.

The chancre may appear in one of several different forms. Of these the deep, or conical, or Hunterian chancre, the chancrous erosion, and the dry chancre, or infecting papule, are the commonest. They all have one thing in common, and that is in their development they cause such irritation that marked induration takes place about and beneath the base of the chancre. The chancrous erosion and the Hunterian chancre are those met with about the oral cavity. Very soon after the appearance of the chancre enlargement takes place in the lymphatic glands directly associated with the base of the sore. This is due to a lymphoid adenitis, and to this is due the bubo or specific lymphatic tumor associated with chancre as primary syphilis.

An ulcer within the mouth or on the lip, of a duration of some weeks, and associated with a tumor of the lymphatic glands in the vicinity, should give rise to a suspicion of the presence of primary syphilis, especially if the person be a young man or woman, and the patient should be carefully examined and interrogated as to the cause of the ulcer.

The induration in chancre, especially of the lip, is peculiar. If it be the deep or Hunterian type, and you take the parts between your fingers, it feels as if you held a bullet, in the top of which, extending toward the center, is the ulcerating chancre. In the chancrous erosion the induration is often referred to as parchment induration—it imparts the feel of a thickened layer. It is superficial, but of considerable area.

The victim of syphilis, after about six weeks of primary syphilis, begins to show some evidences of constitutional infection. He complains of slight fever and a general indisposition. If seen at this time the chancre has probably cicatrized, the bubo diminished in

size, but the lymphatic glands at large have become involved, and a general lymphatic adenitis results. The lymphatics can often be felt as thickened cords. Sometimes when the lymphangitis is more marked they can be seen as red lines over various parts of the body. The lymphatic glands above the internal epicondyle and about the neck—especially behind the sterno-mastoid—and the post auricular glands are almost invariably involved, and form valuable diagnostic signs. They feel like small pebbles beneath the skin.

Some morning the patient observes, after exertion perhaps, or after a bath, that his skin is mottled, and on closer examination he finds himself spotted like a leopard, but the spots are rose-colored, and disappear temporarily under pressure. This is the earliest syphiloderm, and is usually regarded as ushering in the secondary stage of the disease. In rapid sequence we have the papular eruption, presenting a strongly marked eruption across the forehead, and known popularly as the "corona veneris." All these syhilodermata have a peculiar dull copper-color as a rule. Then the pustular and tubercular syphilides follow, often in rapid succession, sometimes so rapid that the next syphilide appears before the former disappears, and this gives rise to the remarkable appearance of a variety of eruptions *coexistent,* and known as the polymorphous syphiloderm. Even before the skin manifestations occur there is present pain in the bones, most severe at night.

During this stage we also have the secondary iritis, alopecia, local and diffuse analgesia, and, most important to you, the throat and mouth complications. Syphilitic sore throat is often an early secondary symptom, and is generally associated with mucous patches of the tongue, pillars of the pharynx, uvula, and inside of cheeks. These oral patches are virulently contagious. Many dentists have become infected from them—have developed chancre of the finger, and have gone through all the stages of this disease. What is the mucous patch? It is a syphilitic rash in those positions where there is heat and moisture—where the epithelium is macerated. Hence it is found about the natural orifices; also beneath the breasts in women; also within the mouth and vagina.

Remember that the secondary moist manifestations are virulently contagious, and that if you put your finger into the mouth of a patient having mucous patches, and you have an abrasion on your

finger, you are almost certainly sure to become infected, unless there be some special or exceptional immunity.

Mucous patches within the mouth are grayish-looking, surfaces slightly raised, and showing an abundance of macerated epithelium. They are seldom symmetrically disposed, their irregularity of distribution being a diagnostic sign. A little later they ulcerate, the ulcers frequently existing as fissures. About the uvula they often run a rapid course, and destruction of portions of the soft palate is frequently the result. Deep ulceration of the pharynx is very common. The roof of the mouth is often involved, generally among the later secondary lesions, and frequently coexisting with gummatous nodules of the hard palate. Unless now the most active treatment is employed extensive destruction of the hard palate may ensue.

Tertiary syphilis may come on as early as the second year of this disease; sometimes it is many years later before its lesions develop. The tertiary lesions are not generally contagious, and when they develop about the oral cavity are of the gummatous and tubercular varieties. These often lead to extensive necrosis of the hard palate; less frequently of the lower jaw. The bones of the nose are most vulnerable, and the disease often invades the air sinuses at the base of the skull. The tongue and salivary glands occasionally become affected with tubercular syphilis, a condition simulating hard cancer and sometimes mistaken for it.

Hereditary syphilis is unfortunately often seen. It seldom appears until two or three weeks after birth, when the infant shows evidences of a rhinitis, and gradually develops a snuffling and discharge from the nose. The victim suffers from malnutrition, looks aged and wizened, and frequently secondary eruptions appear, especially bullæ and vesicles on the palms and soles of the feet. Often destructive infiltrations occur in the septum nasi and other nasal structures, and in the floor of the nose, and the peculiar flat, distorted, sunken nose, with the projecting natiform frontal bosses, form the deformed but unmistakable "facies syphiliticæ." Fortunately seventy-five per cent of these infants die before the second year, but those who live show remarkable changes in the form of the permanent central incisors. These are pegged, or notched, or irregularly developed, and are familiar to you as Hutchinson's teeth.

The subject of hereditary syphilis, you are to remember, is lia-

ble to develop any or all of the contagious secondary lesions, including mucous patches, and later the tertiary lesions. It is contended by Colles that a child may inherit syphilis from the father, the mother remaining immune, immunized by the leucomaines and toxins produced in the infected child entering the mother's blood. Profeta has shown that a child may be born free of or immune to syphilis, both parents being syphilitics prior to the tertiary stage. It is contended that tertiary syphilis is not transmissible to the progeny. These are very important matters in the practical consideration of the subject to the medical adviser and to the bench and bar.

I think I have shown that the dentist must, for his protection, be able to recognize syphilis when he sees it; also, that he must exercise extraordinary care to prevent infection; also, that his instruments are easily contaminated, and must be made surgically clean, to protect the non-syphilitic patient.—*International.*

RADICAL TREATMENT OF THE MAXILLARY ANTRUM. By Lee Maidment Hurd, M.D. Read before the New York Institute of Stomatology, December 6, 1904. The antrum of Highmore, as we all know, is liable to become the seat of a suppurative inflammation either acute or chronic. Of the chronic cases, which we are about to consider, nearly one-half are secondary to an inflammatory condition about the roots of the teeth, and practically all the others are of nasal origin. The chronic cases may begin with an acute inflammation which subsides into a chronic condition, or it may be insidious from the beginning.

The more prominent symptoms are a purulent discharge from the nose, sometimes so slight as hardly to be noticeable; in fact, the most frequent cause of one-sided purulent nasal discharge is antrum disease. Nasal obstruction on the affected side, sometimes on both sides, is frequent. Pain around the eye is found in a great many cases, but pain in or over the antrum is rare and is caused only by retention of the pus under pressure or a neurasthenic tendency in the patient. Trigeminal neuralgia and pain in the vertex or occiput are frequently present when the sphenoid is involved, and pain at the inner side of the eye generally means that the anterior ethmoid cells are affected. Tenderness on pressure over the cuspid fossa is generally present, but not invariably. Gastric disturbances are frequently present from the swallowing of pus at

night, also a bad taste in the mouth in the morning. Sometimes frontal headaches are present, but more frequently infraorbital neuralgia or shooting pains in the teeth. This dentalgia does not necessarily mean that the antral trouble originated in the teeth. The pus in the nose sooner or later sets up a chronic rhinitis. Once in a great while eye symptoms develop, affections of the tear ducts, a recurring iritis, or a chorioretinitis.

In regard to diagnosis, pus under the middle turbinate may come from the frontal or anterior ethmoid cells as well as from the antrum. As the antral orifice is near the roof, the head held horizontally and to the opposite side will increase the flow of pus, if it is not too viscid. A small silver canula can sometimes be passed through the antral orifice and the cavity either inflated with compressed air or irrigated, which will bring out whatever it contains and give valuable aid in arriving at a diagnosis. It is justifiable to remove part of the middle turbinate to gain an entrance to the antral orifice. If you still fail, an exploratory puncture through the wall of the middle or inferior meatus or through the cuspid fossa may be made. This is done with a trocar and canula or a specially devised steel exploratory needle. In using the middle meatus route care should be taken not to enter the orbit by mistake.

I prefer the cuspid fossa or interior meatus route, for then one can inflate with compressed air and drive the contents of the antrum out through the normal opening. Aspirating is not very reliable, as the membrane is liable to be thick and the needle may not pass through it, and again the pus may be so viscid that it will not pass through the needle; but by inflating or douching through the needle or canula you will break through whatever membrane may cover it and drive the thick secretion out through the normal orifice, taking for granted that it is open because of the pus in the middle meatus.

Transillumination is of some help, especially where the affected side is quite dark, but is not at all reliable. It may be a rudimentary antrum that causes the darkness, for example.

If there is an opening through a tooth socket from which pus is flowing, then there is not much doubt about the diagnosis.

The hardest part of all is to determine whether the antrum is truly the site of the inflammation or only a reservoir for pus coming down from the frontal or ethmoid cells. This is at times a

difficult point to decide, which may require repeated examinations and sometimes treatment of these cells.

In treating the antrum, most of the cases of nasal origin get well spontaneously or with nasal douching. Those of dental origin as a rule do not, but treatment of the roots of the affected tooth and the necrotic bone about them, with irrigations through a tooth socket (Cowper's operation) or through the cuspid fossa, will cure a large per cent of them. If this method is not successful at the end of three or four months it never will be. Of the chronic cases very rarely will one recover with nasal irrigations alone. A certain number will be cured by irrigations through a tooth socket. Of those of nasal origin part will get well by making as large an opening as possible into the antrum through the middle or inferior meatus (Mikulicz's operation), with irrigations and the application of antiseptics. But there are a number of cases in which none of these procedures will effect a cure, and a more radical operation must be performed. Caldwell, Luc, Boenninghaus and Jansen at about the same time began to adopt more radical measures. The operation I am about to describe follows the method of Jansen nearer than that of the others. Before giving the technique of the operation I will present the histories of two cases, to illustrate some of the points in diagnosis and the result of operation.

CASE I.—C. I., male, aged twenty-four years. Consulted me October 22, 1903, because he had lost a rubber drainage-tube into the antrum that he had been wearing in an opening through the tooth socket of his second molar. The antral trouble dated back three years, when he had a decayed tooth removed, part of the root remaining until about one year after the removal of the tooth, when he began to have a purulent discharge from the nose. He had the root extracted, a hole bored into the antrum through the socket, and a rubber drainage-tube inserted, which he wore until it slipped into the antrum six weeks previously. During the time he had the tube in place the discharge greatly diminished, but never entirely ceased. When I first saw him he was thin, anemic, had gastric disturbances, headaches, pains about the eyes, a bad taste in the mouth, purulent discharge from the nose and alveolar opening, and nasal obstruction. On examining the nose the membrane over the turbinates was swollen, middle more than the inferior, and

pus was emerging from the middle meatus. Operated upon October 23. The antral mucous membrane was found in a state of polypoid degeneration from one-quarter to one-half of an inch in thickness, with the rubber tube in the cavity. No necrotic bone was found. The patient was out of bed the next morning, and the only evidence of the operation was some swelling of that side of the face, and he left the hospital the next day. November 13 the discharge had ceased, and he has gained fifteen pounds since the operation.

The preceding case is a clear one of antrum disease of dental origin. The following case shows the difficulty at times of arriving at a diagnosis and the source of the trouble. CASE II.—W. Z. M., male, aged twenty-two years. Consulted me because of an offensive odor and purulent discharge from the nose, with severe headaches and vomiting. Two years previously he had an ulcerated tooth removed. He first noticed purulent discharge from the nose about three months later, but just previous to noticing the discharge he had his nasal septum operated upon and wore a nasal splint afterwards. Under these circumstances it is hard to say which was the cause of the infection, except that if it was caused by the nasal operation it probably would have subsided spontaneously. The patient himself thinks that the tooth caused the trouble. On examination, I found the affected side of the nose very narrow from the septum deviating to that side, and the upper part of the nose filled with creamy pus, with an offensive odor of dead bone. The nose was so narrow and the mucous membrane so swollen that it was hard to make out the landmarks. There was a swelling of the mucous membrane in the region of the ethmoidal bulla and middle turbinate, with a perforation near the center of this swelling leading into the antrum, and on probing dead bone was felt, but the pus coming from so high up in the nose led me to believe the trouble might be in the frontal sinus, but as that was the only symptom of frontal disease present I continued my investigation of the antrum, by puncturing the cuspid fossa and inflating the antrum, which caused the nose to fill with very offensive pus. Transillumination gave no aid, there not being much difference between the two sides. As I was sure of the antrum trouble I operated upon that first. As a preliminary step to give me room in the nose I straightened the septum. On entering the antrum I found the lining membrane from one-quarter to three-eighths of

an inch in thickness, and necrosis of the upper portion of the nasal wall and of the ethmoid cells. The packing was removed on the fourth day and the nose douched thereafter.

The operation is performed under ether anesthesia with the jaws held apart by a mouth-gag placed on the opposite side to the trouble, the choana on the side of the lesion tamponed, and a gauze packing placed between the cheek and the jaws well back to prevent blood from running into the pharynx. The cheek is retracted upward and outward with a blunt extractor placed in the angle of the mouth. This gives a very good view of the field of operation. The incision is made from the last molar to the cuspid, about one-quarter of an inch below the gingivo-labial fold, down to the bone. Then the periosteum is elevated over the entire anterior wall of the antrum, and as far on the lateral wall as necessary. Now, by placing the retractor into this incision and elevating the soft parts a good view is obtained of the cuspid fossa. With a chisel an opening is made at the most depressed portion of the fossa, large enough to admit a rongeur, with which the entire anterior and part of the lateral wall of the antrum are removed, care being exercised not to wound the membranous lining of the antrum, thereby avoiding troublesome hemorrhage. Now that the bony walls are removed, incise the lining mucous membrane and examine the interior of the antrum for granulations, character of membrane, foreign bodies, etc.

Remove the entire membranous lining of the antrum, giving especial care to the superior internal and external angles. The bone may now be examined for necrotic spots, which are more frequently found about the roots of the teeth or on the upper nasal wall. Necrosis is frequent in the cases operated upon. It is almost needless to say that all necrotic bone must be completely removed down to healthy tissue, and any partitions or ridges in the antrum should be broken down and made smooth with the walls. The next step is to remove the bony nasal wall completely, from the floor to the roof, from the anterior margin to the posterior. This is accomplished by placing the little finger in the nose to act as a guide, and chipping the bone away with a curet or forceps. After a little practice this can be done quickly without injuring the mucous membrane. The inferior turbinate bone should also be shelled out in the same manner. The next step is to

examine the ethmoid cells, and if affected they should be removed with a curet or forceps, and if the sphenoid sinus is involved the anterior wall and lining membrane should be removed. Now, with the mucous membrane remaining on the nasal wall, flaps are made to help line the antrum. If you have all the membrane from the middle meatus to the floor, including that of the inferior turbinate, two largs flaps can be made, one to partly cover the roof and external wall, and one for the floor. I divide the membrane from its anterior attachment and then make a horizontal incision just above the membrane of the inferior turbinate back to the attachment to the bone. The upper flap I place partly on the roof and partly on the external wall and suture the end to the periosteum at the external angle of the incision. The lower flap is laid on the floor of the antrum and sutured in a like manner to the periosteum, as far externally as it will reach. I now pack the cavity firmly with iodoform gauze in such a way that it can be removed through the anterior nares, and the close the buccal wound with silk sutures. On the fourth or fifth day the packing is removed and not replaced, also the sutures, the cavity simply being douched thereafter several times daily with a normal salt solution.

There is considerable swelling of the upper lip and cheek from the stretching received during the operation. Some cases need an opiate to relieve the pain after operation, as the infraorbital nerve is injured during the operation. There is no sensation in the soft parts for a number of weeks. The cases can generally leave the hospital the day after the packing is removed.

Indications for the Radical Operation.—If a diseased antrum has been treated for several months by one of the more conservative methods without result the radical procedure becomes necessary to effect a cure. In certain cases that have received no previous treatment it seems useless to try the conservative operations, namely, where there is considerable necrosis, which can generally be diagnosed by the odor and probe, or where the ethmoids and sphenoid sinus are extensively involved.

Advantages of the Operation.—You have a full view of the interior of the antrum, and in removing the nasal bony wall and using the nasal mucous membrane to partially line the antral cavity, the antrum, as such, is eradicated and made part of the nasal

cavity proper, making a recurrence of the disease impossible, as there is no antrum, only a recess in the nose which is accessible through the anterior nares. The mucous membrane of the inferior turbinate continues to functionate, as is shown in an attack of acute coryza, when it swells, as does the turbinate of the other side. The opponents of this method contend there are two disadvantages—one, that it will cause a dry pharyngitis from increasing the caliber of the nasal chamber; in fact, it is not increased as much as they think, as the posterior third of the inferior turbinate remains, and part or all of the middle turbinate, unless the ethmoids have been involved. The other is that it does not always cure. I have yet to see a case it has not cured where the disease has been fearlessly and thoroughly removed.—*International.*

Relative Professional Increase.—The number of clergymen has increased from 1880 to 1900 just 73.24 per cent, which is larger than the increase in population. Dentists have increased 140.90 per cent; journalists, 144.05 per cent; lawyers, 78.63 per cent; and doctors, 55.30 per cent. Literary pursuits have increased 507.87 per cent, while the comparatively new profession of electrical and civil engineering has increased 1,037.34 per cent. It is notable that the old professions, such as the clergy, doctors and lawyers, while maintaining a normal rate of increase, have not shown the expansion which the newer professions have. It is worthy of remark that the number of those whose occupations supply many of the refinements of civilization, such as artists, literary people and actors, have gained immensely in this commercial, money-making age. Nevertheless, in the fields of literature, art and acting, this period is noteworthy for the absence of any geniuses of the first rank.—*The Commoner.*

Oxygen in Surgical Infections.—Dr. Thiriar recently communicated to the Belgian Académie de Médecine his further successful experience with the direct application of a stream of oxygen to infected tissues. He uses it in the form of a permanent application—a tube is inserted in the lesion, communicating with the oxygen tank, and left undisturbed for several days. Every case of infection of a serous membrane has been benefited by this treatment in his experience, but the results have been most striking in gaseous septicemia. The oxygen not only stimulates the tissues and promotes phagocytosis, but also kills the germs, substituting an oxygenated emphysema for the microbian emphysema. Oxygen applied under pressure to a furuncle or carbuncle has always aborted or cured it in a few days, and it has proved its usefulness in hundreds of cases of diffuse phlegmons, gangrenous erysipelas, suppurating complicated fractures, and arthritis. He does not advocate it for generalized infections, although recent publications have proclaimed the feasibility of intravenous injections of oxygen, with which Thiriar has had no experience.—*Jour. Amer. Med. Assn.*

The Dental Digest.

PUBLISHED THE LAST WEEK OF EVERY MONTH

At 2231 Prairie Avenue, Chicago,

Where All Communications Should be Addressed.

Editorial.

SHOULD DENTISTS SPECIALIZE?

Up to a few years ago the average practitioner was and felt himself to be competent to perform all the work incident to the practice of his profession. Perhaps the first hint of specialization came with the advent of crown and bridge-work, and the idea grew in favor with the development of oral surgery, orthodontia, porcelain work, and prophylaxis. In nearly all our large cities are now to be found one or more men who make a specialty of extracting teeth, and as practice makes perfect and as their offices are especially equipped for the work, the better class of practitioners turns over to them all their extraction cases. Specialists in orthodontia, oral surgery, and porcelain are also found in the larger centers of population. For a long time a considerable number of the better educated class of practitioners has been favoring operative at the expense of prosthetic work, the outgrowth of which was first the assistant, who was chosen because of his ability along mechanical lines, and later the public dental laboratories. This disposition on the part of these men has been severely criticised, but principally by dentists who started practice thirty or forty years ago, especially those whose work and talents have been more along mechanical than operative lines. We think this criticism is ill-advised, for the practice of dentistry is too apt to turn men into mere mechanics, and any time that can be saved by getting away from some of the drudgery may be devoted to study and research work with much better results. The practice of medicine is becoming more and more specialized, and while of course the practice of dentistry cannot be divided on such broad lines as that of the parent profession, there is certainly room for considerable specialization. We are not prepared to say just where

or how the divisions should be made, but this is a subject which is well worth investigation, and we invite an expression of opinion from our readers. In this connection we publish the ideas which some prominent members of the profession expressed at the last meeting of the New York State Dental Society.

Dr. E. H. Angle, St. Louis: "The hope of the future for dentistry lies along the lines of specialization. I believe that the greatest progress from now on must be effected by following this plan. I believe that the fundamental principles of dentistry should be taught broadly and thoroughly to all students up to a certain point, after which each student should be compelled to specialize on some branch best suited to his aptitude and liking, and that his last year should be devoted exclusively to the study of this branch, under the most favorable conditions, unhampered and unencumbered by other branches. In other words, I believe it is far better for colleges to so fit their students for their life's work that they can do some one thing well, rather than many badly, as is now the rule."

Dr. George E. Hunt, Indianapolis: "Specialization is inevitable in every profession. There is just as much reason for believing that the specialist will get surer, quicker, better results in correcting oral deformities than the general practitioner, as there is that the oculist will secure the desired results in a case of astigmatism more certainly than the general practitioner of medicine. If I am arrested, charged with larceny, I secure a criminal lawyer, not a railroad lawyer. So if I have some necrosed bone removed I call a man who is constantly doing that kind of work rather than a man with a reputation for making gold fillings."

Dr. Emory A. Bryant, Washington, D. C.: "I favor the practice of a specialty in dentistry for the same reason that calls for specialization in medicine, namely, that the time involved to bring required results in certain branches in our profession, the skill, the thought, the care and the special study involved, require that the operations be as limited in kind and number as possible. No one man is so constituted as to be able to be expert in all the branches of dentistry, and the best results for the patient can be had only from the operations in which the dentist is expert. The general practitioner in either medicine or dentistry cannot give the time to the patient or to a study of the requirements of special cases that is absolutely necessary to obtain perfect results. This is a fact more

prominent in dentistry than in medicine on account of the mechanical nature of our profession, and when I say mechanical I mean scientific-mechanical nature."

Dr. R. Ottolengui, New York: "In regard to specialization, the trend is in that direction and it is inevitable. Specialization is being adopted in all branches of the arts, sciences and professions; how, then, can dentistry escape? I would be in favor of post-graduate courses which would give the specialists additional degrees, to indicate that they have specially applied themselves to what they would aim to make their life-work."

Dr. Frank L. Platt, San Francisco: "The ground that certain branches of the practice of dentistry should be in the hands of specialists seems to be well taken, for the reason that they demand special skill in an unusual degree, and consume time out of all proportion to the fee the average practitioner can hope to receive for such services. They also involve to an unusual extent the safety, appearance and health of the patients."

Dr. J. D. Patterson, Kansas City: "I am in accord with specialties in dentistry, if the specialist gravitates into his specialty after considerable experience in general practice, but the specialist who is young in professional life exasperates me and arouses my sympathy at the same time, for my experience teaches that he is 'Too smart for anything.' The judgment necessary to practice 'orthodontia,' 'treatment of gum diseases,' etc., must be a matured one, and that can be gained only by long experience."

Dr. W. H. Whitslar, Cleveland: "I favor specialization for those who are abundantly able to carry out the practice of a specialty to its fullest extent. It is, however, narrowing one's capacity for a larger usefulness, but life is too short to be able to do everything well."

Dr. E. T. Darby, Philadelphia: "Yes, I favor specialization in practice. I think the man who attempts to do all branches of practice is less likely to produce good results than the man who attempts but one line. I do not mean by this that he may not insert as good dentures and perform as good operations in the mouth, but he does it under less favorable conditions, unless it be that his practice be not too exacting. I think orthodontia should be in the hands of one who devotes his entire time to that branch of practice."

Notices.

NORTH DAKOTA BOARD OF DENTAL EXAMINERS.

The North Dakota Board of Dental Examiners will hold its next meeting for examinations July 11-13, 1905, at Grand Forks. Applications for examination should be filed with the secretary on or before July 1.

H. L. STARLING, Secy, Fargo.

INDIANA STATE DENTAL ASSOCIATION.

The Indiana State Dental Association will meet in Indianapolis at the Claypool Hotel, June 27-29, 1905. Good papers, good clinics, good exhibits, good fellowship. Everybody come. A. T. WHITE, Secy, Newcastle.

NORTHERN INDIANA DENTAL SOCIETY.

The annual meeting of the Northern Indiana Dental Society will be held at Logansport, Sept. 19-20, 1905. An excellent program of clinics and papers has been prepared, and the profession is cordially invited to meet with us.

F. M. BOZER, Secy, Logansport.

ATLANTA SOCIETY OF DENTISTRY.

The Atlanta Society of Dentistry was organized May 25, 1905, and the following officers were elected: President, W. M. Zirkle; Vice-president, M. D. Huff; Secretary, J. H. Lorenz; Treasurer, DeLos Hill; Librarian, Oscar L. Rudisil.

KENTUCKY STATE DENTAL ASSOCIATION.

The Kentucky State Dental Association held its annual meeting at Louisville, May 15-16, 1905, and elected the following officers: President, Henry M. Pirtle; Secretary, W. M. Randall; Treasurer, F. R. Wilder, all of Louisville.

IOWA STATE DENTAL SOCIETY.

The Iowa State Dental Society held its annual meeting at Des Moines, May 2-4, 1905, and elected the following officers: President, C. M. Work, Ottumwa; Vice-president, F. B. James; Secretary, C. W. Bruner, Waterloo; Treasurer, Mae Reynard.

NEW ORLEANS COLLEGE OF DENTISTRY ALUMNI ASSOCIATION.

The Alumni Association of the New Orleans College of Dentistry held its annual meeting at New Orleans, May 4, 1905, and the following officers were elected: President, R. D. Nettles; Vice-president, R. A. Esnard; Secretary, J. P. Wall; Treasurer, H. G. Hooper.

HAMILTON DENTAL ASSOCIATION.

The Hamilton (Ont.) Dental Association was organized May 3, 1905, and the following officers were elected: President, D. Clark; Vice-president, Chas. Thompson; Secretary and Treasurer, J. C. Sweet; Executive Committee, Drs. Overholt, Burnett and Cowan.

WASHINGTON UNIVERSITY DENTAL ALUMNI ASSOCIATION.

The annual meeting of the Alumni Association of the Dental Department of Washington University was held at St. Louis, May 1, 1905, and the following officers were elected: President, B. N. Pitken; Vice-president, H. F. Hageman; Secretary, F. B. Lynott; Treasurer, W. A. Roddy.

NEW YORK STATE DENTAL SOCIETY.

The annual meeting of the New York State Dental Society was held at Albany, May 12-13, 1905, and the following officers were elected: President, W. J. Turner, Brooklyn; Vice-president, W. A. White, Phelps; Secretary, Chas. S. Butler, Buffalo; Treasurer, C. W. Stainton, Buffalo.

DETROIT DENTAL SOCIETY.

The Detroit Dental Society held its annual meeting May 11, 1905, and elected the following officers: President, W. A. Giffin; Vice-president, G. C. Bowles; Treasurer, J. M. Thompson; Secretary, F. W. Macdonald; Board of Censors, D. B. Watkins, C. C. Noble, L. N. Hogarth.

DRAKE DENTAL ALUMNI ASSOCIATION.

The Drake Dental Alumni Association held its annual meeting at Des Moines, May 1, 1905, and elected the following officers: President, J. H. McGuire, Des Moines; Vice-president, O. S. Wolf, St. Louis; Secretary, J. A. Hallett, Des Moines; Treasurer, C. H. McConaughy, Des Moines.

WISCONSIN STATE DENTAL SOCIETY.

The thirty-fifth annual meeting of the Wisconsin State Dental Society will be held at Oshkosh, July 18-20, 1905. An excellent program of papers and clinics is being prepared by the executive committee. All ethical members of the profession are invited to meet with us.

W. H. MUELLER, Sec'y, Madison.

ARKANSAS STATE DENTAL ASSOCIATION.

The Arkansas State Dental Association held its annual meeting at Texarkana May 22-23, 1905, and elected the following officers: President, A. L. Pendergrass, Helena; 1st Vice-president, R. W. Quarles, Van Buren; 2d Vice-president, T. Y. Cooper, Little Rock; Secretary and Treasurer, Henry P. Hopkins, Argenta; Corresponding Secretary, J. C. Settles, Arkadelphia. The next meeting will be held at Ft. Smith.

WATERBURY DENTAL SOCIETY.

The Waterbury (Conn.) Dental Society held its first regular meeting May 17, 1905, and elected the following officers: President, W. O. Beecher; Vice-president, F. J. Erbe; Secretary, F. C. Margraff; Treasurer, R. W. Van Waggoner; Executive Committee, E. J. Abbott, G. F. Lancaster, G. G. Herr.

LINCOLN DENTAL COLLEGE ALUMNI ASSOCIATION.

The annual meeting of the Alumni Association of the Lincoln (Neb.) Dental College was held at Lincoln, May 19, 1905, and the following officers were elected: President, J. B. Troyer, Seward; Vice-president, B. C. Meredith, York; Secretary, Mattie Davis, Lincoln; Treasurer, B. H. Harris, Auburn.

ST. LOUIS SOCIETY OF DENTAL SCIENCE.

The annual meeting of the St. Louis Society of Dental Science was held May 9, 1905, and the following officers were elected: President, Otto J. Fruth; Vice-president, E. E. Haverstick; Secretary and Treasurer, Emma Eames Chase; Curator, G. H. Westhoff; Member Board of Censors, George W. Owen.

HARRIS DENTAL ASSOCIATION.

The annual meeting of the Harris Dental Association was held at York Furnace, Pa., May 3, 1905, and the following officers were elected: President, A. W. Rogers; Vice-president, B. S. Witmer; Secretary, P. R. Byerly; Treasurer, W. H. Trout; Executive Committee, H. D. Knight, W. H. Lowell, H. K. Baer.

CONNECTICUT STATE DENTAL ASSOCIATION.

The Connecticut State Dental Association held its annual meeting at New Haven, April 19, 1905, and elected the following officers: President, Edward B. Griffith, Bridgeport; Vice-president, Albert W. Crosby, New London; Treasurer, W. O. Beecher, Waterbury; Secretary, W. V. Lyon, Bridgeport; Librarian, R. H. Keeler, New London; Editor, A. H. Spicer, Westerly, R. I.; Executive Committee, E. S. W. Brown, New Haven; C. C. Prentiss, Hartford.

UNIVERSITY OF PENNSYLVANIA PACIFIC NORTHWEST DENTAL ALUMNI ASSOCIATION.

The annual reunion of the Pacific Northwest Dental Alumni Association of the University of Pennsylvania will be held at the University Club, Portland, Ore., Saturday evening, July 15, 1905. All members of the Association are earnestly requested to be present, and all visiting University of Pennsylvania graduates who expect to be in Portland at that time are most cordially invited to meet with us.

CHAS. E. MCCLURE, Secy, Burke Bldg., Seattle.

OKLAHOMA DENTAL ASSOCIATION.

The Oklahoma Dental Association held its annual meeting at Oklahoma City, May 15-17, 1905, and elected the following officers: President, T. P. Bringhurst, Shawnee; Vice-president, E. N. Hilborn, McLoud; Secretary and Treasurer, C. L. White, Oklahoma City. The meeting next year will be held at Oklahoma City.

LAWRENCE DENTAL CLUB.

The fourth annual meeting and banquet of the Lawrence (Mass.) Dental Club were held May 10, 1905, and the following officers were elected: President, J. P. Reardon; Vice-president, W. H. Caffey; Secretary, Robt. Farquhar; Treasurer, C. E. Frank; Executive Committee, A. D. Bevington; C. W. Partridge, M. A. Dignam.

LOUISIANA STATE DENTAL SOCIETY.

The Louisiana State Dental Society held its annual meeting at New Orleans, May 5-6, 1905, and elected the following officers: President, V. K. Irion; 1st Vice-president, M. C. Blanchard; 2d Vice-president, J. W. Tenny; Recording Secretary, H. B. MacGruder; Corresponding Secretary, A. L. Plough; Treasurer, Chas. Mermilliod.

NEW HAMPSHIRE STATE DENTAL SOCIETY.

The New Hampshire State Dental Society held its annual meeting at Manchester, May 9-11, 1905, and the following officers were elected: President and Treasurer, Wm. A. Young, Concord; Vice-president, Byron Staples, Portsmouth; Secretary, Fred F. Fisher, Manchester; Executive Committee, John H. Worthen, Concord; A. P. Straw, Claremont; Librarian, E. W. Moore, Newport.

LEBANON VALLEY DENTAL ASSOCIATION.

The annual meeting of the Lebanon Valley Dental Association was held at Pottstown, Pa., May 17, 1905, and the following officers were elected: President, R. J. Wall, Harrisburg; Vice-president, S. B. Detwiler, Schuylkill Haven; Recording Secretary, H. J. Herbein, Pottsville; Corresponding Secretary, F. K. Filbert, Pottsville; Treasurer, E. D. Wagner, Lebanon. The Association will meet next year at Lebanon.

SIXTH DISTRICT DENTAL SOCIETY OF NEW YORK.

The Sixth District Dental Society of the State of New York held its thirty-seventh annual meeting at Binghamton, May 5-6, 1905, and re-elected the following officers: President, Albert V. Needham, Oneida; Vice-president, Wm. J. LeSeuer, Oneonta; Secretary, F. W. McCall, Binghamton; Treasurer, H. D. Whitmarsh, Binghamton; Censor, F. B. Darby, Elmira. The next meeting will be held at Owego, Oct. 5, 1905.

KANSAS STATE DENTAL ASSOCIATION.

The Kansas State Dental Association held its annual meeting at Topeka, May 18-20, 1905, and elected the following officers: President, G. F. Ambrose, Eldorado; 1st Vice-president, G. A. Esterly, Lawrence; 2d Vice-president, W. A. McCanter, Topeka; Secretary, F. O. Hetrick, Ottawa; Treasurer, H. W. Fessenden, Ottawa.

WASHINGTON STATE DENTAL SOCIETY.

The Washington State Dental Society held its annual meeting at Tacoma, May 20, 1905, and elected the following officers: President, C. A. Darling, Bellingham; Vice-president, Joseph Dunning, Spokane; Secretary, F. W. Williams, Seattle; Treasurer, E. Hurd, Hoquiam. The next annual meeting will be held at Bellingham in May, 1906.

ROCHESTER DENTAL SOCIETY.

The annual meeting of the Rochester Dental Society was held May 9, 1905, and the following officers were elected: President, L. C. Jones, Wolcott; Vice-president, L. S. Goble; Secretary, G. C. Low; Treasurer, W. A. Windell; Librarian, B. S. Hert; Editor, W. W. Smith; Member Board of Censors, I. C. Edington; Curator, Chas. H. Ward.

TEXAS STATE DENTAL ASSOCIATION.

The Texas State Dental Association held its annual meeting at Austin, May 18-20, 1905, and elected the following officers: President, Pitt S. Turner, Belton; 1st Vice-president, W. R. Rathbone, Cuero; 2d Vice-president, R. D. Griffis, Paris; Secretary and Treasurer, Bush Jones, Dallas. The next annual meeting will be held at Galveston in June, 1906.

SOUTHWEST VIRGINIA DENTAL SOCIETY.

The Southwest Virginia Dental Society held its annual meeting at Pulaski, May 11-12, 1905, and elected the following officers: President, W. S. Gregory, Roanoke; Vice-president, W. P. Nye, Radford; Secretary and Treasurer, L. E. Ward, Pocahontas; Executive Committee, F. L. Black, Bluefield, W. Va., J. V. Haller, Wytheville, F. W. Eheart, Blacksburg.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

The annual meeting of the Southern Wisconsin Dental Association was held at Racine, May 31, 1905, and the following officers were elected: President, J. J. Wright, Milwaukee; 1st Vice-president, C. F. Rodolph, Muscoda; 2d Vice-president, J. A. Heidbrink, Union Grove; Secretary, C. W. Collver, Clinton; Treasurer, W. G. Hales, Mineral Point; Publication Committee, B. C. Campbell, Lake Geneva; J. J. Wright, Milwaukee; W. V-B. Ames, Chicago. The next annual meeting will be held at Milwaukee.

C. W. COLLVER, Secy.

BALTIMORE COLLEGE OF DENTAL SURGERY ALUMNI ASSOCIATION.

The Alumni Association of the Baltimore College of Dental Surgery held its annual banquet at Baltimore, May 11, 1905, and the following officers were elected: President, H. J. Burkhart, Batavia, N. Y.; Vice-president, W. G. Foster; Secretary, W. W. Dunbracco; Treasurer, George V. Milholland; Executive Committee, G. M Smith, George Hardy, C. M. Gingrich, all of Baltimore.

ALABAMA STATE DENTAL ASSOCIATION.

The Alabama State Dental Association held its thirty-sixth annual meeting at Gadsden, May 11-12, 1905, and elected the following officers: President, N. N. Vann, Attalla; 1st Vice-president, Chas. L. Gunn, Gadsden; 2d Vice-president, A. T. Reeves, Selma; Secretary, L. A. Crumley, Gadsden; Treasurer, W. B. Fulton, Birmingham; Executive Committee, L. F. Luckie, Gadsden; T. P. Whitby, Selma; Press Editor, W. J. Reynolds, Selma.

INTERSTATE DENTAL FRATERNITY.

The Board of Governors of the Interstate Dental Fraternity will convene for the annual business meeting of the Order in Buffalo on Monday, July 24, 1905. The annual banquet will occur during the week and due notice thereof will be sent to the members as soon as arrangements can be made and the exact date fixed. It is hoped that the fraternity will meet in large numbers on this occasion.

R. M. SANGER, Nat'l Sec'y, East Orange, N. J.

NEBRASKA STATE DENTAL SOCIETY.

The annual meeting of the Nebraska State Dental Society was held at Lincoln, May 16-18, 1905, and the following officers were elected: President, A. H. Hipple, Omaha; Vice-president, E. A. Meservey, Kearney; Corresponding Secretary, M. E. Vance, Lincoln; Recording Secretary, N. H. Morrison, Red Cloud; Treasurer, H. T. King, Fremont; Member Board of Censors, O. L. Beeson, Beatrice. The next meeting will be held at Omaha.

NEW JERSEY STATE DENTAL SOCIETY—COMMITTEE ON CLINICAL CONFERENCE.

The New Jersey State Dental Society extends a special request to any members of the profession having an abnormal or difficult case to present same at the session of the Society to be held in the Auditorium, Asbury Park, N. J., July 21, 1905, at 3 p. m. Cases may be presented either by a clinic or before men from whom advice may be gained toward successful treatment. It is hoped that the younger members of the profession will accept this as a special call to them and not refrain from presenting any perplexing cases upon which assistance is desired. The chairman requests notice as soon as possible of the cases to be presented.

J. G. HALSEY, Chairman, Swedesboro.

NATIONAL DENTAL ASSOCIATION—SECTION ONE.

The following program will be offered for the consideration of this Section in Buffalo July 25-27, 1905:

Calvin S. Case, Chicago, "Orthodontia."
C. Edmund Kells, Jr., New Orleans, "Orthodontia."
V. H. Jackson, New York, "Orthodontia."
R. Ottolengui, New York. "Orthodontia."
H. H. Johnson, Macon, Ga. "Prosthetic Dentistry."
Frederic Freeman, Boston. "Prosthetic Dentistry."
W. Storer Howe, Philadelphia. "Crown and Bridge Work."
Special paper by R. H. Hofheinz, Rochester, N. Y. "The D. D. S. Abroad."
J. G. FIFE, Secy., Dallas, Texas.

THOMAS P. HINMAN, Chairman, Atlanta, Ga.

NATIONAL DENTAL ASSOCIATION—SECTION TWO.

The following program will be offered for the consideration of this Section in Buffalo, July 25-27, 1905:

J. V. Conzett, Dubuque, Ia. "Gold as a Filling Material."
B. L. Thorpe, St. Louis. Lantern Lecture—"Pioneer Manipulators of Gold Foil."
Chas. Milton Ford, New York City. "Dental Education."
W. R. Clack, Clear Lake, Ia. "The Necessity for and Method of Preserving the Integrity of the Interproximal Space."
D. O. M. Le Cron, St. Louis. "A Few Experiments in Porcelain"
D. W. Fellows, Portland, Me. "A Century of Standard Dental Writings."
B. Holly Smith, Baltimore. "Operative Dentistry."
Prof. Geo. B. Snow, Buffalo. (To be announced.)
W. H. K. Moyer, Little Falls, Minn. (To be announced.)
D. R. Stubblefield, Nashville, Tenn. "Nomenclature."
S. H. Guilford, Philadelphia. "The Nomenclature of Orthodontia."
C. S. BUTLER, Secy., Buffalo.

HOWARD E. ROBERTS, Chairman, Philadelphia.

NATIONAL DENTAL ASSOCIATION—CLINIC SECTION.

The work of the Clinic Section is progressing most favorably. Everything at present indicates that the operative clinic will be the largest that the National Dental Association has ever held. There will be forty operators for both mornings upon which the clinics will be held. The territory from Maine to Utah and from Minnesota to Texas has been very fully covered, and men from almost all of the states in the section named have signified their willingness to be present and operate. The majority of the men of the G. V. Black Dental Club will be present and operate upon both days. Such well-known northwestern men as Drs. Searles, Lewis, Clack, Conzett, Beemer, G. D. Moyer, W. H. K. Moyer, W. D. James, F. S. James, Gallagher, Carlson, Fawcett and others, will once more operate in a body, as was done at the International Dental Congress.

Dr. T. W. Brophy of Chicago has kindly consented to assist and will make a surgical operation. Dr. Brophy's clinics are of such a high order that those interested are certain of seeing something which they will not soon forget. Dr. M. C. Smith of Lynn, Mass., will also make a surgical operation. Somnoforme and narcotile will be very fully demonstrated. A large number of men will give table clinics. At the present writing I feel confident in saying that the best men in the profession will operate at Buffalo on July 26 and 27. A full report has not been received from all the men on the Committee, but sufficient data are before me upon which to base the opinion above expressed. The program will appear in the July dental journals.

E. K. WEDELSTAEDT, Secy., N. Y. Life Bldg., St. Paul.

SOUTH DAKOTA STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the South Dakota State Board of Dental Examiners will be held at Mitchell, July 11, 1905, beginning at 1:30 p. m. All candidates will be required to do practical work in both operative and prosthetic dentistry, and should bring all instruments and material necessary for same. Vulcanizers, lathes and swaging appliances will be furnished by the Board. Application and fee of $10 must positively be in the hands of Secretary before July 7.

G. W. COLLINS, Secy., Vermilion.

GEORGIA STATE DENTAL SOCIETY.

The Georgia State Dental Society held its annual meeting at Atlanta, May 4-6, 1905, and elected the following officers: President, S. H. McKee, Americus; 1st Vice-president, Wm. Crenshaw, Atlanta; 2d Vice-president, T. C. Gibson, Forsythe; Treasurer, H. A. Lowrance, Athens; Recording Secretary, DeLos Hill, Atlanta; Corresponding Secretary, D. H. McNeill, Athens; Executive Committee, W. C. Miller, Augusta; E. A. Tigner, Milledgeville; H. Mason, Macon; W. M. Zirkle, Atlanta; W. E. Bugg, Madison. The next meeting will be held at Savannah.

ILLINOIS DENTAL SOCIETY.

At the annual meeting of the Illinois State Dental Society, held at Moline, May 9-11, 1905, the following officers were elected for the ensuing year: President, S. Finley Duncan, Joliet; Vice-president, L. W. Skidmore, Moline; Secretary, Elgin MaWhinney, Chicago; Treasurer, Chas. P. Pruyn, Chicago; Librarian, J. T. Cummins, Metropolis City; Program Committee, J. P. Buckley, Chicago; Clinic Committee, W. F. Whalen, Peoria; Committee on Science and Literature, E. H. Allen, Freeport; Committee on Art and Invention, C. E. Jones, Chicago; Editor of Transactions, Edmund Noyes, Chicago; Members of Executive Council for 3 years, C. C. Corbett, Edwardsville; M. R. Harned, Rockford; A. D. Black, Chicago; Local Committee of Arrangements, T. P. Donelan, E. F. Hazell, E. A. Kartack, all of Springfield. The next meeting will be held in Springfield, May 8-11, 1906.

ELGIN MAWHINNEY, Secy., 34 Washington St., Chicago.

LATEST DENTAL PATENTS.

783,327. Dental root-impression and swaging instrument, Adelbert W. Starbuck, Iowa City, Iowa.
783,358. Tooth-crown anchor, Samuel S. Bloom, Philadelphia.
783,609. Tooth-regulator, John E. Canning, Denver.
783,804. Dental measuring instrument, Lawrence A. Smith, Port Gibson, Miss.
783,959. Dental separating disk, Roscoe H. Hull, Worcester, Mass.
784,060. Manufacturing dental plates, Jean P. Matheret, Paris, France.
784,098. Dental root extractor, Walter S. Beazley, Lancaster, Ky.
785,018. Dental forceps, Ira P. Norton, Laporte, Indiana.
785,529. Dental jaw brace. Charles A. Thomson, Belleville, N. J.
785,548. Dental chair. Aaron P. Gould, Canton, Ohio.
785,619. Dental matrix retainer. Closson M. Leffingwell, Little Falls, Minn.
785,715. Manufacture of artificial teeth or the like. Frederic A. J. Cournand, Paris, France.
785,788. Dental tool. Raimund Zentner, Weisbaden, Germany.
785,904. Waxing-up tool for dental trial plates. Andrew May, St. Catherine's, Canada.
785,992. Shade guide for artificial teeth. George H. Whiteley, York, Pa.
785,993. Mold for artificial teeth. George H. Whiteley, York, Pa.
785,999. Connection for artificial teeth and dental plates. Samuel S. Bloom, Philadelphia.
786,279. Apparatus for making dentures. George P. Franklin, Philadelphia.
786,662. Dental engine attachment. John E. Morgan, Emporia, Kan.
786,678. Dental floss holder. Clifton M. Rawlins, Cleveland.
786,748. Artificial denture. Benson W. Fordyce, Bedford, Iowa.

News Summary.

G. W. Gandee, a dentist of Parkersburg, O., died suddenly May 18, 1905.

Frederick Morrison, a retired dentist of Harrisburg, Pa., died May 18, 1905.

D. K. Murchison, 38 years old, a dentist of Angleton, Tex., died May 7, 1905.

W. W. Pafford, a dentist of Idabell, Tex., died of hydrophobia May 21, 1905.

D. M. C. White, 85 years old, a dentist of Hampton, Pa., died May 23, 1905.

H. O. Rogers, a dentist of Ottumwa, Ia., died May 19, 1905, at Phœnix, Ariz.

T. J. Holder, 72 years old, a dentist of Gallatin, Tenn., died suddenly May 5, 1905.

J. F. MENSEL, 55 years old, a dentist of Chicago, died of heart disease May 21, 1905.

E. A. BARTLETT, a dentist of Binghamton, N. Y., died May 7, 1905, of diphtheria.

W. S. FOOTE, a dentist of Kenilworth, Ill., recently suffered a severe stroke of paralysis.

E. G. REYNOLDS, a dentist of West Newfield, N. H., committed suicide May 11, 1905.

GEORGE B. HARRIMAN, 68 years old, a dentist of Boston, died May 22, 1905, of pneumonia.

WILLIAM P. SAVARY, 53 years old, a dentist of North Easton, Mass., died April 30, 1905.

GEORGE CUNNINGHAM, a dentist of St. Louis, attempted suicide May 17, but was revived.

OSCAR POZZESSI, 50 years old, a dentist of Vailsburg, N. J., died May 22, 1905, of apoplexy.

GEORGE C. HUBBARD, 32 years old, a dentist of Brazil, Ind., died May 4, 1905, of consumption.

E. B. DOWNING, a dentist of Kansas City, Mo., attempted suicide May 14, but was revived and sent home.

C. A. BLANCHARD, 40 years old, a dentist of Caliente, Nev., died May 10, 1905, from congestion of the lungs.

GEORGE R. WHITNEY, 76 years old, a dentist of Brockton, Mass., died in Chicopee Falls, Mass., May 7, 1905.

THOMAS W. BLANTON, a dentist at Cleveland, O., had an insanity complaint filed against him a few days ago.

A. D. BRAINARD, 49 years old, formerly a dentist at Redlands, Cal., died at Greenfield, Mass., May 2, 1905, from paralysis.

W. W. HILL, a dentist of Washington, Ga., engaged in a pistol duel this month with a resident of the town, and in the melee two other men as well as the combatants were wounded.

IDENTIFIED BY HER TEETH.—One of the victims of the terrible railroad accident at Harrisburg this month, a young woman from Cleveland, O., was identified by the gold fillings in her teeth, the rest of her body having been so badly burned that it could not be identified.

PULLING TEETH OBSCENE.—The aldermen of Brooklyn decided a few days ago that the work of an itinerant dentist who affected slouch hats, long coats and gave public performances from a wagon in which was a dental chair, was obscene, in that it was "offensive to chastity, delicacy or decency."

THE GUM SEPTUM.—No matter how perfectly a cavity may be prepared and the filling adapted and condensed, the operation must be considered a failure unless the proximal surface is so contoured that perfect protection is afforded the gum septum, and the retention of food prevented.—C. N. JOHNSON, *Review*.

BAD LIQUOR sometimes produces good resolutions—the next day.

BUSINESS CHANCES.—Will exchange overcoat, 1 pr. goloshes, and chest protector for set of screen doors. No questions asked.

EDUCATE YOURSELF in other directions than the line of your work, so that you will be a broader, more liberal, more intelligent worker.—*Success.*

PINS IN INLAYS.—I do not believe in baking pins into inlays, as they weaken the porcelain more than they give retentive security.—W. T. REEVES, *Register.*

INSANE FROM FEAR OF DENTIST.—This month a woman at Petersburg, Ind., was taken to the state insane asylum, and her relatives state that her mind became unbalanced through fear of having some teeth pulled.

WEDGING INLAYS INTO PLACE.—The soft wood of matches is preferable to orange-wood in wedging inlays into place, as the latter is liable to exert too much force upon frail edges.—J. M. THOMPSON, *American.*

TRIMMING RUBBER BETWEEN PLAIN TEETH.—Old burs or drills ground to a thin point, using the lathe-bur chuck for a handle, are convenient for trimming the rubber between plain teeth. The chuck also makes a good handle for small files.—*A. E. Kellogg,* Cresco, Ia.

PYORRHEA POCKETS.—Packing pyorrhea pockets with menthol crystals a few minutes in advance of operating in the treatment of pyorrhea will afford great relief to the patient. Valuable in case of cocain contraindication and in every way a more pleasant application.—E. D., *Review.*

SWALLOWS TEETH IN ASTONISHMENT.—This month an old man seeing the sights at Coney Island gasped at the thrilling climax of a daring feat and swallowed his false teeth. Fortunately they did not go very far down, and quick work by the hospital surgeons saved him from choking to death.

RELIABLE MODELS.—Plaster models for bridgework are always preferable to those made of any of the investment materials, for the reason that strength and accuracy of outline are essential, while these qualities are not possessed in the greatest degree by models made of investment materials.—H. J. GOSLEE, *Items of Interest.*

ROCKING PLATES.—To prevent plate from rocking from expansion of plaster, as soon as cast is poured sprinkle a little dry plaster on top and lay over it a little piece of non-plastic; place in flask, turn down snug, leave it three hours. The cast will never bulge up in the center—guaranteed. Try it.—I. F. STEELE, *Brief.*

BANKRUPTS.—Zenas J. Herring, a dentist of Atlanta, filed an application in bankruptcy May 18, stating his liabilities to be $412.52, with no assets.—W. W. Moses, a dentist of East Livermore, Me., filed a petition in bankruptcy May 15, giving his liabilities as $853.74 and his assets as $917.99, including $270 worth of tools and $425 worth of books.

LIBELOUS.—Mr. Lawson, in one of his marked letters, calls Mr. Barrow, of the News Bureau, a "dodo-litictapolia specimen."

From C. H. Ward of Rochester comes the advice that the bona fide ultra scientific name for the pot hunter is "pithecanthropus erectus."

We don't know, but both names look libelous to us.

FAMILY PUMICE-STONE DISH.—A year and a half since one of my patients was going to a neighboring city to a preparatory school. I advised him to call on Dr. Blank for prophylaxis treatment and such other service as he might need. When he returned I asked him how he liked Dr. Blank. "Dr. Blank is all right," he replied. "What I object to is his *family pumice-stone dish.*"—T., *Brief.*

EARLY MORNING DENTAL WORK DISASTROUS.—This month a woman in Baltimore tried to arouse a dentist at 5 a. m. His wife drove her away by threatening to throw hot water on her if she did not stop kicking at the front door, but she returned an hour later, and this time the dentist's wife and she had an argument which resulted in her being fined in the police court for assault.

CAVITY FORMATION.—The adaptation of filling to cavity is destroyed as thoroughly, if not as often, by a filling turning within the cavity as by its being forced out of it. While this may often be caused by the inability of the filling material to withstand the stress placed upon it, it is often due to faulty cavity formation, and should be carefully guarded against.—J. F. WALLACE, *Era.*

LOCAL OBTUNDENT.—Melt together in a test-tube equal parts of menthol and cocain hydrochlorate, and add an equal amount of carbolic acid. Keep in a well-stoppered bottle. Before applying the heated solution to the dentin wash the cavity with a warm alkaline solution, and dry with alcohol and hot air. Also useful in reducing pain in fitting bands and removing deposits from roots.—*Era.*

TO PROTECT AND REMOVE RUST FROM STEEL INSTRUMENTS.—(1) Dissolve one part of paraffin oil in 200 parts of benzine. Wash the instruments and dry by warming. Dip in the solution and lay away in a warm place to dry. (2) Instruments of polished steel, iron, nickel, etc., will remain indefinitely free from rust or corrosion if kept in a 2 per cent solution of either the carbonate, bicarbonate, benzoate, or borate of sodium.—*Medical World.*

J. A. BOWMAN, 68 years old, for thirty-seven years in the practice of dentistry at Minneapolis, died May 7, 1905. He was a brother of Dr. G. A. Bowman of St. Louis. He was one of the founders of the Minnesota State Dental Association and had held the offices of vice-president and president in it. In the words of Dr. W. N. Murray of Minneapolis—"He always maintained the high ideals of our profession and was a man of strong character and integrity."

EPIDEMIC OF FAT OUTSIDE THE HEART.—"Dr. —— returned Wednesday from San Francisco, where he went to be operated upon for hernia. Just as the physicians were about to give him chloroform an examination showed his heart to be covered with fat on the outside. Chloroform would have cost him his life. He must diet for weeks to reduce the fat.

"Dr. —— learned that Nellie —— died at Oakland Saturday under exactly the same circumstances.

"Physicians about the bay have taken warning."—*Redding (Cal.) Free Press.*

PAINFUL ERUPTION OF THIRD MOLARS.—In the treatment of gingival and buccal inflammation due to the pathologic eruption of the third molar, the careful application of Nordhausen sulphuric acid decreases the pain and reduces the inflammation, and is easier to carry out than the customary deep lancing of the overlying gum flap. Observe strictly the precautions usual with caustic agents within the mouth; its action should be limited to a definite area.—PIERRE ROBIN, *Rev. de Stomat.*

WHAT KIND OF GAS?—May 15, a dentist in St. Louis filed suit against the gas company of the city for $20,000 damages, alleging that he contracted for a supply of gas at his office and that two months later the gas was shut off without cause. The newspaper report says: "As he used gas not only for lighting, but to administer to patients, as well as in certain other forms of dental work, he alleges that he was forced to give up most of his practice on account of the absence of gas to work with."

ACCIDENTS.—Last month a man at San Bernardino, Cal., had a tooth pulled by an itinerant dentist, with the result that his jaw was broken and he had to go to a hospital.—May 6, Dr. C. G. Bassett of Sidney, N. Y., was badly burned by the explosion of a gasoline tank in his laboratory. His office boy was slightly injured.—May 2, Dr. J. W. Forbes of Horicon, Wis., extracted a tooth for a patient and a piece struck his eye and infected it. Prompt treatment at a Milwaukee hospital saved his sight.

FATALITIES.—May 26, a woman at Schoolcraft, Mich., aged 33, died suddenly in a dentist's chair while having some teeth extracted. Chloroform had been administered by a physician.—May 10, a woman at Wilkesbarre, Pa., died in a dentist's chair while having some teeth extracted. Her family physician was present and nitrous oxid was administered by the dentist.—May 24, a man from Lovettsville, Va., aged 32, died in a dentist's chair at Frederick, Md., while under the influence of chloroform and after sixteen teeth had been extracted.

ILLEGAL PRACTITIONERS.—This month a dentist at Imperial, Cal., was arrested for practising dentistry without a state license.—May 9, a dentist at Manistee, Mich., was arrested for practising dentistry without a license.—May 10, two men at Dayton, O., were arrested charged with the illegal practice of dentistry and their cases were continued under bonds.—This month a dental parlor at Grafton, W. Va., was closed by the state board, and two other dental parlors at Berkley Springs and Hinton were put out of business, as the board found that all of them were practising dentistry illegally.

FIRES.—Dr. Littlefield, Clarion, Ia., May 16, loss $300, insurance $700.—Dr. Whitmore, Marshall, Minn., May 18, total loss.—W. H. Plumpe, St. Louis, Mo., May 15, loss $100.—J. C. Cohen, New York, April 26, total loss.—P. J. Dahlen, New York, May 19, loss 60 per cent, insurance $1,000.—Charles Fox, Brooklyn, May 16, $50.—Charles S. Kerrick, Auburn, N. Y., April 21, damage from smoke.—W. A. Rowland, Utica, N. Y., May 10, $1,000.—L. A. Wood, Lorain, O., May 11, $30.—W. J. Lider, Pittsburg, April 24, loss $1,500, partly insured.—Dr. Bowman, Johnson City, Tenn., May 4, total loss.

He Was Buncoed.—When Congressman John Sharp Williams visits New York he never fails to look in at a small kindling-wood shop presided over by an old negro who was formerly a retainer in the Williams family. On his latest call he found the old man unhappy. "What's the matter, Lafe?" asked Mr. Williams. "I'se just been done out o' some money, Marse John, and that's mattah 'nough," replied the negro. "Had a torribel misery in mah toof and went to a dentist and got hit pulled, and he chaghed me a dollah, a whole dollah. Why, once down in Tenn'see I went to ole Doc. Tinker, and he pulled two toofs and broke mah jawbone, and only chaghed me fifty cents. I'se been buncoed."

Aluminum in Prosthetic Dentistry.—The special merits of aluminum—*pure* aluminum, be it understood—are its extraordinary lightness, its power of resistance to the oral fluids, its indifference to the action of the mucous membrane, its remarkable susceptibility of polish, easy method of working, resistance against oxidation, its superior capability of adhesion. Only the careful practitioner, however, can treat aluminum with success. Care must be taken in selecting the pure and not too soft metal, carefully removing any impurities after rolling or stamping, heating it cautiously and cooling it slowly, and having it not too thin, or it will easily bend; never below 0.7 millimeter for full and at least one millimeter thick for partial plates.—W. Pfaff, *Cosmos.*

Protective Action of Pus.—Binaghi (*Riforma Medica*) has carried out a series of experiments *in vitro* and *in vivo* tending to show the bactericidal action of pus upon certain virulent organisms. The method was to induce the formation of an abscess in rabbits, and then inject cultures of various bacilli (anthrax, tetanus, malignant edema, staphylococcus aureus) into the abscess cavity, and watch the effects. Out of fifteen rabbits operated upon in this manner only two died (from anthrax), and in them the abscess was small and hard, and the injection penetrated the surrounding healthy tissues. The control animals all died. Further experiments showed that pus does not confer a true immunity, but only a relative and temporary immunity, for it was quite possible to reinfect the same animals. The protective action of the pus was not owing to hindered absorption of virulent toxin or failure of penetration of the germs into the circulation, for in reinfection the same obstacles were present as before. Possibly reinfection occurred because of the saturation of the preexistent alexins, and failure to produce tissue owing to impeded leucocytosis. The abscesses were produced by inoculation of pure cultures of staphylococcus aureus and bacillus coli, or by starch powder suspended in sterilized water.

Examining Board Affairs.—At the May meeting of the Georgia Board 83 out of 84 applicants were successful in passing the examination. May 22, the governor appointed Dr. J. W. Jouett a member of the Kentucky board.—At the May meeting of the Michigan Board 30 out of 36 applicants passed the examination successfully.—At the May meeting of the Mississippi Board 36 out of 46 applicants succeeded in passing the examination.—May 11, the Missouri Board elected officers as follows: President, E. P. Dameron, St.

Louis; Treasurer, S. C. A. Rubey, Clinton.—At the May meeting of the New Mexico Board licenses were granted to three applicants.—At the May meeting of the Oregon Board 33 out of 40 applicants succeeded in passing the examination.—At the May meeting of the Tennessee Board 36 out of 46 applicants passed the examination successfully. May 25, the governor appointed B. D. Brabson of Knoxville a member of the Tennessee Board.—May 18, the governor of Utah appointed E. A. Tripp, Stanley Clawson and A. C. Wherry as members of the Board. The Board then met and elected Dr. Tripp president and Dr. Wherry vice-president. H. W. Davis was re-elected as secretary and treasurer.—May 15, the supreme court of Washington upheld the state dental law. April 24, the governor of Washington appointed Frank R. Fisk of Spokane as a member of the Board.

Robberies.—A. R. Hervey, Santa Ana, Cal., May 10, $20 worth of gold.—G. W. Free, Fresno, Cal., May 15, $50.—E. B. Griffith, $25; C. W. Strang, $25; C. F. Gibbs, $30; Dr. Hotchkiss, $75; all of Bridgeport, Conn., May 11.—Janitor stole $300 worth of gold, etc. from the following dentists of Hartford, Conn.: A. E. Cary, A. A. Hunt, and Henry J. Fisk. The thief was caught trying to sell the material at a shop, May 4.—E. E. Vadnais, No. Adams, Mass., May 18, $25.—W. I. Brigham, So. Framingham, Mass., May 24, $20.—J. T. Longstreth Kansas City, Mo., piece of gold bridge work. Thief was caught, feigned insanity, and was sent to the hospital.—F. P. Farrow, Washington, N. J., April 24, $10 and the watch dog.—Henry Miller, Brooklyn, May 16, $160.—J. A. Frankenstein, Buffalo, May 16, $8.—G. H. Ormeroid, Warren, O., May 14, $10.—G. B. Bleiler, Allentown, Pa., May 21, $10.—Lewis D. Pilcher, Norfolk, Va., May 6, $5.—Page S. Lester, Richmond, Va., May 12, $12. Fred Hieden, Milwaukee, Wis., May 2, $40.

Damage Suits.—A dentist in New York City had an Armenian arrested a few days ago because he would not pay a bill of $1 for the extraction of a tooth. The defendant claimed that one of the dentist's assistants filled the tooth two months ago and guaranteed that it would be all right for a year. The defendant claimed that the tooth ached, so he went to the dentist to have it extracted and was charged $1 for the work, which he did not think he should pay. The dentist told the judge that he had not charged anything for removing the tooth, but had charged $1 for the gas which was administered. The judge decided that such a claim was unwarranted and found for the defendant.—May 20, the proprietors of a dental parlor at Pittsburg were arrested and held under bail of $500 each on the charge of assault and battery made by a woman patient. She alleges that they quoted her a price of $25 for a set of teeth and that she paid it, but that they demanded $9 more before giving her the teeth, and that when she refused to pay the additional sum they locked her in a room and tried to take the money from her forcibly.—This month a woman in Milwaukee was sued for $37.50 for professional services by a woman dentist. She brought in a counterclaim for $75 for injuries to her teeth caused by alleged improper work on the part of the plaintiff. She was compelled to pass in review before each member of the jury and exhibit her teeth, but she won the case.

ANNEALING GOLD.—At the Fourth International Dental Congress, Dr. S. Enomoto (Tokio, Japan) presented a new device for annealing gold, the apparatus being entirely inclosed with the exception of small air-holes, thus preventing cold air from reaching the gold-foil and insuring uniform annealing on both upper and lower sides. The apparatus has three trays respectively of mica, of metal, and of sheet asbestos on a metallic tray, the pellets on the different trays reaching the point of perfect annealing one after the other, avoiding the necessity of waiting after using one trayful for another trayful to anneal, thus shortening the duration of the operation. A door in the side of the cover permits lighting the wick of the alcohol burner; the mica front allows sight of the color of the gold while it is being annealed.—*Cosmos.*

TREATMENT OF SENSITIVE DENTIN IN SHALLOW CAVITIES.—Some classes of cavities are very difficult to obtund with chemicals. Shallow or three-walled cavities are difficult, because you cannot produce absorption by pressure. The dentin does not ordinarily absorb, it only transfers. To make the medicines penetrate they must be forced inward by cataphoresis, pressure or heat, and to apply these measures is usually difficult in the cavities where we most desire to obtain an obtundent effect. I have had good results from applying a few crystals of menthol to shallow cavities, and dissolving this in the cavity with a drop or two of absolute alcohol, and then throwing a steady but small stream of compressed air into the cavity until it is dry. I do not know whether the menthol acts chemically by absorption, or whether the action is to be regarded as the physical effect of evaporating these volatile drugs, so producing an excessive evaporation of the tooth-moisture.—GEO. ZEDERBAUM.

SOLDERING WITH ELECTRICITY.—The author had recently to repair a denture of gold through which an opposing molar had worn a hole. As one knows, ordinarily this would mean the removing of the teeth, as they were attached to the plate by vulcanite, involving a great deal of work and some elements of risk. I repaired this plate by attaching to it the negative wire of the lighting circuit and to the positive wire a small carbon, cutting in, in series, a bowl of salt water as a rheostat. The hole in the plate was cleaned and prepared in the usual way, then covered with a piece of foil and 18-k. solder placed on it, and borax for the flux. The carbon point was brought in contact with the solder and then gradually removed, forming the arc, which was held sufficiently long to melt the solder. The hole was closed thereby, and the rubber, hardly an eighth of an inch away, was uninjured; and by immediately immersing the plate in water I did not allow the heat to spread to the surrounding parts. While this case is one that is not common, yet it is well to know that repairs of this kind can be made without going through the laborious operation of taking the bite, etc. The melting of any of the metals—and even of platinum scrap—can be accomplished in the same manner. I have soldered teeth in this way successfully and know that with proper care soldering in many cases can be done with electricity.—HARRY M. HILL, *Era.*

ALCOHOL APPLICATIONS.—Kolbassanko (*Therap. Monats.*) recommends alcohol applications in many surgical diseases. He has seen great benefit from them in simple inflammations, suppuration, and septic conditions, and even upon foci lying at considerable depth. He has been able to prevent many operations by using them alone. Six to eight layers of gauze are saturated with alcohol, varying in strength from fifty-seven to ninety per cent, applied over the diseased area, and covered with a large layer of paraffin paper or oilcloth. The alcohol is renewed as soon as it evaporates. Tender skins are powdered over with xeroform, or covered with an ointment of xeroform, orthoform, lanolin, and vaselin. If the dressing is to be continued some days, the treatment must be interrupted occasionally to permit the skin to recover. The dressing is markedly analgesic, but only while it is moist.

DENTIST CURES SUPPOSED CANCER.—According to newspaper report, a capitalist from Pittsburg went to New York on a visit and while there consulted a dentist regarding a troublesome tooth. For several years what physicians and surgeons pronounced to be a cancerous growth had been slowly but surely eating away his right cheek close to the nose, and as neither operations nór treatment of any sort improved his condition he had made up his mind to die in a short time. After treating the aching tooth the dentist examined his mouth and offered as his diagnosis that the trouble was not cancer but was due entirely to an upper molar. The capitalist finally agreed to let the dentist do what he could, and after an hour's work the tooth was removed and with it the point of an instrument which had been broken off and left in the jaw by a careless dentist years before. Suitable treatment soon effected a complete cure of the trouble.

SCURVY.—Manuiloff (*Russki Vratch—N. Y. Med. Jour.*) describes the epidemic of scurvy which appeared in 1902 in the province of Viatka as a result of the famine in that portion of Russia. The struggle against scurvy was thoroughly organized by the authorities, and a special staff of physicians was detailed for this purpose. The epidemic began in January with eight cases, and increased until it reached 5,836 cases in May, when it began to give way under the efforts of the sanitary authorities, finally disappearing in August. In addition to lack of food, the cause of the epidemic was the severe cold and the crowding of the peasants in their huts, in which domestic animals were also kept. Women suffered more frequently than men, and the disease occurred at all ages from sixteen to seventy years; only in rare cases did it affect children under ten years of age. The treatment consisted in improving the nutrition of the patient, and in the use of preparations of iron, quinin and arsenic. In cases of loss of cardiac tone it was necessary to employ stimulants. The chief articles of diet were milk, vegetables (especially potatoes), beer, wine, lemons, citric acid and cranberry juice. Massage and warm baths gave good results, but were used to a limited extent on account of the lack of facilities. Fresh air and sunlight were very beneficial. The gums were treated by the use of washes with boric acid, potassium chlorate, by painting with iodin, etc. In the presence of extensive hemorrhage in the feet, warm foot-baths and warm compresses with vinegar gave excellent results.

A MASTICATORY AND ORATORICAL HINDRANCE.—James MacDonald of Syracuse, N. Y., sued for the price of a set of artificial teeth, has put in a counter-claim of thirty-four dollars for damages as set forth in the following statement: "Defendant further alleges that by reason of the unskilled workmanship exercised by the plaintiff in the manufacture of said teeth this defendant was unable to use or wear the same without great pain and suffering, that he was unable to eat with them unless he endured great bodily suffering, and that when this defendant attempted to carry on a conversation or make public addresses said teeth would fall from his mouth, thereby causing defendant great annoyance and chagrin, causing him to be held up to ridicule by his friends when said teeth would fall from his mouth, thereby causing defendant much mental anxiety and distress of mind."—*Brief.*

RUST, AND THE INFLUENCE OF CERTAIN SUBSTANCES ON ITS FORMATION.—The presence of copper in water in contact with iron is shown (L. Lindet, *Comptes Rendus*) to considerably flavor the production of iron oxid, while tin, zinc, lead, manganese, aluminum and magnesium retard it. Water which has stood in contact with these metals for some time has the same effect as the metals themselves, the results evidently being due to solution of traces of hydrated oxids. Iron oxid promotes the formation of rust, which spreads very rapidly once it has appeared. Arsenic has a distinct retarding influence, and in sufficient quantity prevents it altogether, ferrous arsenite, which is first formed, being oxidised to the ferric salt, containing only about one-third the amount of ferric oxid obtained under ordinary conditions. Arsenic acid and arsenic trisulphid (orpiment) completely prevent oxidation, but the chlorids and sulphates of sodium, potassium and ammonium, owing to electrolytic dissociation, render it two or three times more rapid. Of organic bodies, sugar, phenol, and resorcinal accelerate rusting, while alcohol and methyl salicylate inhibit it, acetic and salicylic acids dissolving the iron oxid as it is formed. The author considers the rusting of tinned or galvanized iron cans containing methylated spirit for motor purposes to be due chiefly to the light coal-tar naphtha, present to the extent of some 50 per cent, which has a powerful oxidising influence; but although methyl and ethyl acetates do not themselves favor oxidation, the acetates formed by their action on zinc, tin and iron contribute thereto, especially in presence of benzine.

MARRIAGES.—Dr. Baker, a dentist of Peabody, Kan., was married to Miss Fannie Nelson of Peabody, May 24.—Joseph Bingham, a dentist of Aylmer, Ont., was married to Miss Maud Davis of Watertown, S. Dak., May 10.—Charles F. Chandler, a dentist of Wauwatoso, Wis., was married to Miss Florence Byrne of Wauwatoso, June 2.—Will E. Gates, a dentist of Muscatine, Ia., was married Miss Esther Patterson of Muscatine, May 23. The doctor will practice in Paso Robles, Cal.—Dr. Lillian M. Gale, a dentist of Oconomowoc, Wis., was married to Joseph L. Wilsey of Oconomowoc, May 10.—Sherrel Hall, a dentist of Chicago, was married to Miss Ethel Barrows of Oakland, Cal., May 11.—E. H. Kreutzmann, a dentist of La Valle, Wis., was married to Miss Leone Dudleston of La Valle, May 3.—Thomas K. Means, a dentist of Geneva, N. Y., was married to Miss Anna M. Wolf of Philadel-

phia, May 12.—Dr. Pentecost, a young dentist of Greensburg, Ind., was married to Miss Grace Thompson of Greensburg, May 24.—C. W. Powers, a dentist of Dubuque, Ia., was married to Miss Jane Glass of Philadelphia, April 26.—George Reiss, a dentist of Louisville, Ky., was married to Miss Catherine Schaeffer of Louisville, June 6.—Fannie Scott, a dentist of Oakland, Cal., was married to Herbert Wise of Oakland, April 30.—J. M. Shorey, a dentist of Suisun, Cal., was married to Miss Clara Meyer of Santa Rosa, Cal., May 4.—H. M. Thomas, a dentist of Excelsior Springs, Mo., was married to Miss Amy Peterson of Emmetsburg, Ia., April 30.—M. M. Trainer, a dentist of Sibley, Ia., was married to Miss Viola Jones of Oakland, Ind., May 1.

THE BROKEN RESOLUTIONS.—

Oh, Dixie lan' is de lan' er cotton,
But de New Year's pledge—it done fergotten:
Oh, my!
Oh, my!
Dat's what dey does in Dixie!

Dey up en swar dey'll do widout it,
But smacks dey lips w'en dey thinks erbout it,
Oh, my!
Oh, my!
Dat's what dey does in Dixie!

Dey says dat dram is a great reliever—
Rheumatism en brokebone fever:
Oh, my!
Oh, my!
Dat's what dey does in Dixie!

De preacher say, it beats the nation,
End dey des can't git no free salvation:
Oh, my!
Oh, my!
Dey done backslide in Dixie!—*Frank L. Stanton.*

INFLUENCE OF HIGH TEMPERATURE AND OF PUTREFACTION UPON NATURAL AND ARTIFICIAL TEETH.—By Drs. Von Lepkowski and Wachholz. The authors (*Wien. Zahnarztl. Monats.*) have studied the effects of high temperatures upon the structure of natural teeth. The teeth were inclosed in porcelain capsules and were then subjected to high temperatures. Upon withdrawal it was found that the dentin was carbonized, and it reflected rays such as those arising from an anthracite block. The enamel eventually becomes of a brownish tint, preserving, however, its color and gloss longer than does the dentin. When natural teeth are placed in direct contact with the flame the enamel is the first tissue to crumble down. The continued effect of heat renders the tooth of a grayish color, gradually evoluting to white, and in the meanwhile becoming so friable as to crumble to pieces at the slightest appli-

cation of force. Gold and platinum appliances remained unchanged, even when the heat was of such an intensity as to totally carbonize the skull. The subjection of appliances of gutta-percha and nickel to these temperatures resulted in the combustion of the former material to the extent of not leaving the slightest trace; the metal became very brittle. The artificial teeth in the carbonized skulls were in good condition. Amalgam disappeared entirely. Cement fillings did not suffer alterations of form, but became harder and whiter. Amalgam-cement fillings lost the amalgam ingredient, the cement undergoing the changes just mentioned. Porcelain inlays remained intact. Natural teeth subjected to the influence of putrefaction showed after from four to eight months that the enamel was throughout its thickness of a greenish hue. Fillings of gold-amalgam had a copper aspect after four months. Copper amalgam fillings became very rough and covered with verdigris. Cement and nickel darkened, fillings of temporary stopping became softer, and had upon their surfaces growths of different varieties of fungi.

THEORY EXPLODED.—Not long ago, says an exchange, we were sitting in the reception room of a friend who is a dentist. The room has a window which commands a view of the street. The dentist is a man who likes to philosophize.

"People are peculiar," he says. "Now, for instance, see that man across the street looking at my sign. Ten to one he has the toothache, but is hesitating whether or not to come in and be treated. See, he is coming across now. The chances are he will stop at the door, turn about and go away, as his pain will vanish before the fear of possibly suffering greater pain in my chair."

The man comes across the street, looks once more at the dentist's sign, then turns to go away, as he had predicted.

"What did I tell you?" he asks. "It works that way in ninety-nine cases out of a hun—Hold on. He's coming in, after all."

The man has returned, and now enters the reception room. "Is Doctor Yankemout in?" he asks.

"Yes, sir," replies our friend. "I am he."

"Well, I've got this little account against you from the laundry. I wasn't sure this was your place at first, as I am a trifle nearsighted."

WILLING TO TELL.—The gentleman of color on Sixth avenue, the 400-pound dentist sign, clad felicitously in red, white and blue stripes, was attracting the usual attention when a woman stopped.

"Upon what meat doth this our Caesar feed," she asked, "that he has grown so great?"

There came a frown upon the ebony countenance of the sign. "Ma'am?" he queried.

"What do you eat that makes you so fat?" elucidated the woman.

The 400 pounder shrugged his large nonchalant shoulders. "Food; jus' food, ma'am—chicken an' ham an' 'taters an' mo' chicken an' ham an' "—

She didn't wait for the list.—*New York Press.*

PECULIAR INFECTION OF THE MOUTH, TONSILS AND PHARYNX.—H. R. Oliver, San Francisco (*California State Journal of Medicine*), makes a preliminary report on sixteen cases of a peculiar infection of the mouth, tonsils and pharynx observed during the past year. Three cases of the acute form of the disease were seen in children under twelve; all chronic cases were in patients over twelve years. The first symptom is a hard, dry, itchy, paroxysmal cough, dysphagia, coryza, frontal neuralgia, aching of back and limbs. The tongue is coated and strawberry-like, tonsils intensely hyperemic, as are also the uvula and post-pharyngeal walls. Tonsils and uvula enlarge until they nearly meet. The tonsil is covered with a thin, grayish-white membrane, the uvula clean. The cervical and submaxillary glands are swollen and tender. The temperature ranges from normal to 103° F. The membrane on the post-pharyngeal wall forms a definitely outlined V, and is elevated, pearl-gray, adherent, and bleeds if disturbed. Small gray elevated patches, hard and firmly attached, appear on the tongue, usually in the center but sometimes extending to the tip and over the sides. In the progress of the case these originally discrete patches may become confluent. The pharyngeal wall clears first, later the patches on the tonsils slough off, leaving punched-out grayish ulcers. The patches on the tongue also slough out, leaving deep, irregular ulcers. The adenopathy subsides, the temperature falls, but some dysphagia remains, with a hacking cough and hoarse voice. The ulcers persisted in a strong, athletic man of thirty years for three months, and in a healthy man of fifty years for six months.

Cover-slip smears from patches showed numerous bodies, round or ovoid in shape except for a large chromatin granule at the thick end, joined by the constricted neck of a long thread which may or may not be jointed, and may be branched. They take stain slightly, except for spots which stain deeply and are connected with each other by a filament of deeply staining chromatin substance. They stain by Gram's method and all the basic anilin dyes. Pure cultures are difficult to obtain, as are also cultures on artificial media. Oliver succeeded with 8 per cent glucose agar to which was added 1 per cent HCl. He obtained pure cultures in nine cases. They grow slowly—six or seven days. The more severe the case the more threads form and the more adherent the growth. The growth is thick, opaque, moist and elevated. Pure growths on agar can be transplanted to other media. Gelatin is not liquefied. Litmus milk is unchanged. Potato: thick, opaque white growth. Bouillon: no cloud, but heavy sediment. Glucose agar not fermented. Rabbits infected by intraperitoneal inoculation or introduction of cultures into the general circulation died in from three and a half to five days, and exhibited abscesses in heart, kidneys, liver, spleen, adrenal body, lymph-glands, peritoneum, pericardium, brain and parotid, and pure cultures were obtained from all these organs and from the urine.

Descriptions of the microscopic findings are given in detail. That the disease is contagious is proved clinically by two instances of three patients in one family becoming infected one after another, and by the disease attacking one of the doctors, subsequently working at the post-mortem table in the laboratory where the infected rabbits had been autopsied.